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ABSTRACT

This volume in the Applied Developmental Psychology Series consists of a collection of papers on current sibling research and theory. Prominent researchers and academicians in developmental psychology present reports on aspects of sibling relations in an effort to better understand individual and family growth. These scholars have dealt with questions of social and emotional development, the role of shared and non-shared environment on siblings, consequences of divorce and other family difficulties, and ways to treat sibling and family problems. The specific topics of study included: (1) "Siblings, Parents, and Peers: A Longitudinal Study of Social Influences in Adolescent Risk for Alcohol Use and Abuse"; (2) "Brothers and Sisters in Middle Childhood and Early Adolescence: Continuity and Change in Individual Differences"; (3) "Sibling Relationships in Middle and Old Age"; (4) "Siblings, Behavioral Genetics, and Competence"; (5) "Adult Sibling Relationships: Racial and Ethnic Comparisons"; (6) "Personality and Sibling Relationships"; (7) "Delinquency and IQ: Using Siblings to Find Sources of Variation"; (8) "The Family Contexts of Children's Sibling Relationships"; (9) "Negative Sibling Interaction Patterns as Predictors of Later Adjustment Problems in Adolescent and Young Adult Males"; and (10) "A Risk-Amelioration Model of Sibling Relationships: Conceptual Underpinnings and Preliminary Findings." (SD)

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Sibling Relationships: Their Causes and Consequences

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ADVANCES IN APPLIED DEVELOPMENTAL PSYCHOLOGY

SIBLING RELATIONSHIPS: THEIR CAUSES AND CONSEQUENCES

ADVANCES IN APPLIED DEVELOPMENTAL PSYCHOLOGY

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SIBLING RELATIONSHIPS: THEIR CAUSES AND CONSEQUENCES

edited by

Gene H. Brody

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PREFACE

Irving E. Sigel

Gene Brody has established a reputation for being one of the foremost developmental psychologists to investigate the field of sibling relationships, providing extensive literature on studies of various combinations of siblings in the context of the family.

The significance of such studies might appear obvious to the readers of this volume. If one were to trace the history of sibling studies done by psychologists, one would be shocked to discover how recently the proliferation began. Why wouldn't as central and as pervasive a phenomenon be studied? The answer may in part be that psychologists were interested in discovering universal laws of development, tending to downplay or ignore family studies. From this reasoning, why study siblings? With the advent of the awareness that children's development could not to be understood in terms limited to studies of aggregate populations without regard to family contexts, it became evident that, in order to build a science of child psychology, a more intensive research effort directed at within-family interactions would be essential. So investigators who were somewhat daring and innovative began to study siblings as one constellation of human intrafamilial interactions. One of the major superb controlled studies of siblings' growth and development was carried out by Dr. Helen Koch (1954) at the University of Chicago. To my knowledge, such a massive study has never been replicated. Gene Brody has followed this tradition of studying siblings in family contexts.

Recognizing the complexity of reporting advances in this field, Brody, together with some of the best investigators in the field, addresses many aspects of sibling relations so that the dynamics of individual and family growth can be better understood.

In this volume Brody has brought together prominent researchers who have directed their attention to the study of siblings. These scholars have prepared reports of their research dealing with questions of social and emotional development, the role of the shared and non-shared environment of siblings, consequences of divorce and other family difficulties, and ways to treat sibling and family problems. This update will bring their studies of siblings into a focus much needed at this time.

The publication of this volume continues the tradition of the Applied Developmental Series in providing a forum for the presentation of au courant theory and research on a significant problem in developmental psychology so that academia and practitioners can get a sense of what is a being done about particular issues.

It gives me great pleasure to introduce this collection of papers under the editorship of Gene Brody.

REFERENCE

Koch, H. L. (1954). The relation of "primary mental abilities" in five- and six-year-olds to sex of child and characteristics of his sibling. *Child Development*, 15, 209–223.

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SIBLINGS, PARENTS, AND PEERS: A LONGITUDINAL STUDY OF SOCIAL INFLUENCES IN ADOLESCENT RISK FOR ALCOHOL USE AND ABUSE*

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Early adolescents experiment with a range of socially proscribed behaviors, including the use of alcohol. Although some sampling of typically adult activities appears to be normative and perhaps even developmentally appropriate during this period, the initiation of drinking at this time in life brings with it increased risk for later problems with alcohol and other substances (Hawkins, Lishner, Catalano, & Howard, 1986; Kandel, 1975; Kandel, Kessler, & Margulies, 1978; Kumpfer & Demarsh, 1986; Svanum & McAdoo, 1991). Moreover, early experimentation with alcohol is related to a broad constellation of problem behaviors such as minor delinquencies or sexual involvements that often have adverse developmental consequences (Jessor & Jessor, 1977; National Institute on Alcohol Abuse and Alcoholism, 1990). Early initiation of deviant or antisocial behaviors, such as early-onset drinking, can also lead to significant developmental problems during middle and late adolescence, thus making difficult a successful transition to adulthood (Sampson & Laub, 1993).

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*This chapter is based on collaborative research involving the Iowa Youth and Families Project at Iowa State University, Ames, and the Social Change Project at UNC-Chapel Hill. The combined research effort is currently supported by the National Institute of Mental Health (MH43270, MH48165), the National Institute on Drug Abuse (DA05347, DA07029), the John D. and Catherine T. MacArthur Foundation Program for Successful Adolescent Development among Youth in High-Risk Settings, and a Research Scientist Award (MH00567). Requests for reprints should be addressed to Rand Conger, Department of Sociology, 107 East Hall, Iowa State University, Ames, IA 50011.

Taken together, prior research findings indicate that early adolescent drinking may lead to chronic impairments in both emotional functioning and social relationships (Coombs, Paulson, & Palley, 1988). Adolescent alcohol use also increases risk for physical health problems. For example, adolescents who drink are more likely to be involved in accidents that produce significant injuries or even death (National Institute on Alcohol Abuse and Alcoholism, 1990). Indeed, reckless driving, which often involves the abuse of alcohol, is a leading cause of death and disability for youth. These negative effects of alcohol use and abuse have become so pervasive that they constitute a major public health problem (Adams, Blanken, Ferguson, & Kopstein, 1990).

Despite this significant negative influence, research to date has not clearly identified either the precursors of early-onset drinking or factors that lead to increased alcohol use from early to later adolescence. Yet, better understanding of such predisposing mechanisms will be needed in order to develop more effective prevention or intervention programs designed to reduce the incidence of adolescent alcohol use and abuse. In this report we propose and evaluate a social process model of adolescent drinking behavior in an effort to add to the available knowledge base regarding this important social and developmental phenomenon. In particular, the study addresses an important but largely neglected issue in research on adolescent alcohol use, the role of siblings in family risk for early drinking (Barnes, 1990).

A SOCIAL PROCESS MODEL OF ADOLESCENT DRINKING

Although several decades of research on adolescent problem behaviors has focused primarily on peer influences, recently investigators increasingly have turned their attention to family factors that both exacerbate child maladjustment and increase the child's probability of associating with deviant or antisocial peers (Elliott, in press; Gottfredson & Hirschi, 1990; Melby, Conger, Conger, & Lorenz, 1993; Patterson, Reid, & Dishion, 1992; Simmons & Blyth, 1987; Steinberg, Mounts, Lamborn, & Dornbusch, 1991; Youniss & Smollar, 1985). These researchers suggest that the dynamics of family life during childhood and early adolescence play an important role in promoting a developmental trajectory that either (a) fosters youth competencies that reduce the probability of associating with deviant friends, or that (b) intensifies antisocial behaviors that increase the likelihood of entering into relationships with similar peers.

In this chapter we focus on factors within the family that promote deviant peer relations, and we suggest three avenues through which adolescents may acquire alcohol-using friends. The behavior of other family members, including parents and siblings, is expected to increase directly the risk of choosing friends who drink. We also believe that the target adolescent's own drinking behavior will play a major role in determining his or her choice of friends. Of particular importance, our model of family influence examines the role of siblings in these processes. As Barnes (1990, p. 151) noted: "One of the most neglected areas of research regarding family influences on the development of adolescent drinking is the relationship of siblings . . . in the initiation and continuation of substance use among adolescents."

Our model of social influence (Figure 1.1) draws heavily on the work of Barnes (1990), who suggests that family processes involving siblings, parents, and adolescents affect selection into social networks involving peers outside the home. According to the model, parents promote association with alcohol-using peers primarily through their childrearing behaviors. In this investigation, we predicted that a harsh, unpredictable home environment would both increase the attractiveness of peer relations and fail to prevent association with peers who are engaging in risky behaviors such as alcohol use (Conger, 1976; Patterson et al., 1992). That is, parents who are harsh and irritable reduce the positively reinforcing nature of the home environment, thus increasing the value of positive interactions with peers outside the home. Moreover, parents who fail to monitor the types of friends with whom their adolescent associates, and who inconsistently enforce rules about inappropriate peer relations, increase the risk that their child will develop friendships with others who are engaged in deviant activities. Additionally, several studies have shown that hostile and rejecting parenting behavior and harsh, inconsistent discipline directly predict adolescent substance use (Barnes, 1990; Conger, et al., 1991; Hawkins, Catalano, & Miller, 1992; Jones & Houts, 1990; Patterson, 1986). Thus, as shown in Figure 1.1, we also predicted a direct path from negative parenting behaviors to adolescent drinking.

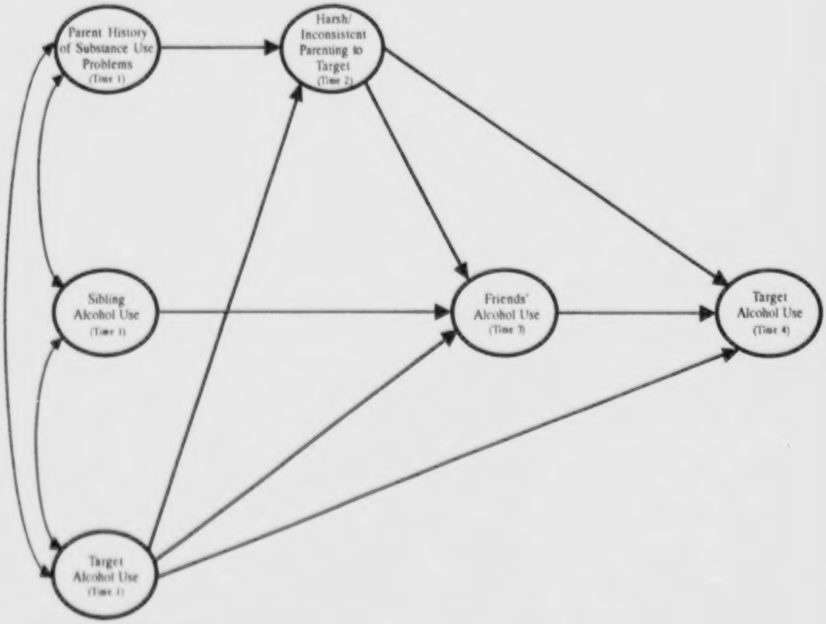
Parent History of Substance Use Problems (Time 1)
Harsh/ Inconsistent Parenting to Target (Time 2)
Sibling Alcohol Use (Time 1)
Friends' Alcohol Use (Time 3)
Target Alcohol Use (Time 4)
Target Alcohol Use (Time 1)

FIGURE 1.1 The theoretical model.

Previous research has shown that, under stressful conditions, parents are more likely to engage in the types of harsh and inconsistent behaviors just described. In difficult circumstances, parents may (a) be less capable as agents of socialization (Patterson, DeBaryshe, & Ramsey, 1989), and (b) model inappropriate and coercive behaviors that would be detrimental if emulated by the child (Christensen & Margolin, 1988; Jourilies, Murphy, & O'Leary, 1989). A parent's history of significant substance use, we expected, would be one indication of greater risk for a variety of psychological problems and the attendant life stresses they produce (e.g., Chassin, Pillow, Curran, Molina, & Barrera, 1993). Consistent with recent findings reported by Chassin and her colleagues (1993), we also expected that parental substance use in general (i.e., use of alcohol, drugs, and/or tobacco) rather than alcohol use alone would suggest greater parental stress. Early initiation of drinking behavior by the target adolescent also was predicted to be another chronic stressor for parents, having the capacity to disrupt the parent's childrearing behaviors toward the youth (see also Patterson et al., 1989). Thus, as shown in Figure 1.1, we expected that parents experiencing chronic stress due to both their own past or present difficulties with substances and their adolescent's drinking problems would be more likely to take a harsh and inconsistent approach to parenting.

Of particular importance for the present study, the second proposed vehicle for promoting association with peers who drink is sibling drinking behavior. We expected that, net of the parental and adolescent influences just discussed, siblings who drink would serve as models for use and also as potential sources of encouragement to use. Earlier research has demonstrated the possibility of such influences both from older to younger siblings and from younger to older brothers and sisters (Brook, Whiteman, Gordon, & Brenden, 1983; Lauritsen, 1993). Thus, according to the model (Figure 1.1), siblings provide an avenue for social learning and reinforcement of drinking behavior as suggested by several theorists (e.g., Bandura, 1977; Patterson et al., 1992). We propose that their drinking behavior also legitimizes associating with same-age peers outside the family who drink, as indicated by the path from sibling to friend's alcohol use. Indeed, consistent with Barnes (1990), the theoretical model suggests that across time, friends' use should be the most proximal factor in adolescent drinking; thus, we hypothesize that sibling drinking will have an indirect influence, through peer relations, on later adolescent alcohol use.

Finally, we hypothesized that the target adolescent's own early alcohol use would be associated with selection into social groups that include alcohol-using peers. As has long been noted in the literature, antisocial youth tend to "flock together," presumably because these associations will reinforce existing behavioral repertoires, and also because they are more likely to be rejected by more conventional peers (Gottfredson & Hirschi, 1990; Patterson et al., 1992). Furthermore, the model also predicts continuity in the target adolescent's drinking behavior over time, a well-established empirical generalization (Jessor, Donovan, & Costa, 1991; Sampson & Laub, 1993). Overall, however, we expected that friends who drink would have the most powerful direct impact on later target alcohol use (Elliott, Huizinga, & Menard, 1989), and that as adolescents move from the family to the world outside the family, their closest friends will have an increasingly powerful influence on their social behaviors.

Methodological Issues in Testing the Model

In addition to the substantive issues addressed by the study, an important feature of the research design is the inclusion of reports by multiple family members. Most research on adolescent substance use involves information provided only by a single respondent, usually the adolescent. This measurement approach can produce significant upward bias in estimation of structural parameters for a specific theoretical model (Bank, Dishion, Skinner, & Patterson, 1990; Lorenz, Conger, Simons, Whitbeck, & Elder, 1991). For example, with results based on reports by a single respondent, it is difficult to determine whether a strong relation between sibling and adolescent drinking reflects the real state of affairs or whether it is based on the rationalization of heavy drinkers that others are drinking as well. To overcome this problem, in the following analyses parents, siblings, and target adolescents independently reported their involvements with alcohol. In addition, both target adolescents and siblings reported on the target's degree of involvement with friends who drink. Moreover, the measures of parenting behavior were based on ratings by multiple family members as well as by independent project observers. Finally, we evaluated the theoretical model using a longitudinal research design, which allows stronger inferences about directions of influence than does the more typical cross-sectional approach (e.g., Chassin et al., 1993).

METHOD

Sample

At the first interview in 1989, the sample for these analyses included 451 families. We used listwise deletion of missing data across four years of data collection to obtain the final sample of 371 families with complete data for the mothers' analyses and 368 families with complete data for the fathers' analyses. These were white, primarily lower-middle and middle-class families. Because of the rural focus of the study, all families lived in small towns or the countryside. Specifically, 34% lived on a farm, 12% lived outside a town but not on a farm, and 54% lived in a town with a population no greater than 6,500. During the first year of the study, each family included two parents, a seventh-grade target adolescent (*M* age = 12.7 years), and a near-aged sibling. For the mother's analyses, 200 of the seventh graders were girls and 171 were boys. There were 197 seventh-grade girls and 171 seventh-grade boys for the father's analyses. The average family size was 4.95 members, and family median income for 1988 was $33,399.

Participants were interviewed in four successive years, 1989 (when the target adolescent was in seventh grade), 1990, 1991, and 1992. The retention rate for each year of data collection was about 95%. Families who withdrew from the study were, in most respects, similar to those who remained in the study. In terms of education, however, fathers who dropped out averaged 12.74 years of education, whereas those who remained in the study averaged 13.58 years. This difference was statistically significant ($p < .05$). Mothers who dropped out averaged 12.87 years of education, which was not significantly different from the 13.48 years of education for mothers who stayed in the study. Other longitudinal studies of families with adolescents also reported greater attrition of less educated parents (e.g., Flanagan & Eccles, 1993).

Procedures

The families in this study were recruited through all 34 public and private schools with a seventh-grade class in selected communities in eight counties. Names and addresses of seventh-grade students and their parents were obtained from all schools in communities of 6,500 or less. After receiving a letter explaining the project, families were contacted by telephone and asked to participate. About 78% of the eligible families agreed to take part in the study. Each participating family member was paid approximately $10 per hour of participation.

Each year of the study, families were visited twice in their own homes. During the first visit, each of the four family members completed a set of questionnaires focusing on, among other things, family member and family interaction characteristics. The second visit occurred within two weeks of the first. A trained interviewer began the second visit by asking both parents and the two children to complete independently a checklist designed to identify current disagreements or conflicts between the parents and children. Potential areas of disagreement included household chores, homework, transportation, and so on. After completing the checklists, family members were asked to gather around a table for the videotaping of four different structured interaction tasks.

For the general interaction task (task 1), family members were given a set of cards containing questions about areas of their family life such as parenting, performance in school, household chores, and important family events. The topics on the cards were similar to those covered in the questionnaires. For example, one question asked the target child to describe what his or her parents usually did when he or she got into trouble for doing something wrong. For all cards, participants were asked to discuss their answers with one another.

As for all four tasks, the interviewer explained the task procedures, completed a practice card with the family, and checked the videorecording equipment before leaving the room for another part of the house. The family spent a total of 35 minutes discussing the task 1 cards. The problem-solving task (task 2) began shortly thereafter and lasted 15 minutes. During this task, family members discussed and attempted to resolve up to three problems identified on the previously completed questionnaires. The third task involved only the two siblings and lasted 15 minutes. The two children discussed topics such as things they do together, school activities, and their plans for the future. During the sibling interaction task, the parents completed questionnaires in another room. For the fourth task, the husband and wife spent 30 minutes discussing several topics including the history and status of their relationship, areas of agreement or disagreement, and their plans for the future. Meanwhile, the two children worked on questionnaires in another room. The analyses reported here used observational data collected from task 1 in the study's second year, and questionnaire responses from the first, second, third, and fourth years.

The videotaped family interactions were coded by trained observers, who rated several dimensions of family interaction and individual member characteristics. The observers received two months of training and passed extensive written and viewing tests before coding videotapes. Approximately 25% of all tasks were randomly assigned to be coded by a second, independent, reliability coder. Following procedures recommended by Suen and Ary (1989), intraclass correlations were used to estimate interobserver reliability for each rating scale. An observer rating manual with complete definitions for all rating scales and descriptions for all task procedures is available from the first author.

Measures

Parents' History of Substance Use Problems. We have postulated (see Figure 1.1) that a key factor in predicting adolescent alcohol use is the parents' history of substance use problems. Three indicators, each composed of reports from both parents, were used to measure past and present parental substance use and associated problems. First, each parent reported on his or her own past use of alcohol. Parents were asked if they had "ever had enough alcohol at one time to get drunk?", and also if there was ever "a time in your life when you or someone you were close to felt you had a drinking problem?" As was the case with all of the parents' substance use self-report items, these questions were answered either yes or no (no = 1, yes = 2). Each parent also reported on his or her spouse's past use of alcohol. Parents were asked if their spouses had ever "had problems with alcohol" during the time the couple had been married. Responses to this question, as well as to the remaining spouse-report questions, ranged from 1 = *strongly disagree* to 5 = *strongly agree*.

Three self-report and two spouse-report items were used to measure past illegal use of drugs or overuse of prescription pills. Parents reported if they had ever used illegal drugs, ever used them on a regular basis, and if "you or someone you were close to felt you had a drug problem from using too many prescription or illegal drugs." Each parent was also asked if his or her spouse ever "had problems from taking too many prescription drugs" and "problems with illegal drugs." For the final indicator of parent substance use problems, we asked parents whether or not they had ever smoked or chewed tobacco. We also obtained spouse reports of "health problems from tobacco use."

All three indicators of parent substance use problems are summed indexes. When creating these measures, correlations between the self- and spouse-report items were first examined. In all cases, the correlations were statistically significant ($p < .05$). For example, the correlation between the mother's self-report of her smoking and her spouse's report of her smoking problems was .53 ($p < .01$), whereas the father's smoking self-report correlated .46 ($p < .01$) with his spouse's report of his smoking problems. Having judged the self- and spouse-report items to be satisfactorily correlated, we standardized all responses and summed the related items to form the three indicators. Internal consistency for the scales ranged from $\alpha = .68$ (father's past drug use problems) to $\alpha = .43$ (mother's past drug use problems). For most parents who had a history of substance use problems, these events occurred sometime in the past. For some of them, however, these were ongoing difficulties.

Target and Sibling Alcohol Use. The constructs for alcohol use by the target and his or her sibling were based on two different indicators. The first indicator involved a self-reported count of the youth's drinking frequency during the past year (0 = *never* to 4 = *3 or more times per week*). Each teenager answered three questions indicating how often he or she used three kinds of alcohol: (a) beer, (b) wine or wine coolers, and (c) hard liquor. These responses were summed to create the frequency indicator for the construct. The second indicator was based on the summed responses to 11 items describing problems associated with drinking. The difficulties measured included such things as getting drunk, getting into trouble with parents or friends, having problems at school, and so on. Each teenager indicated whether, during the past year (1 = *never* to 4 = *more than 3 times*), he or she had experienced such problems. Thus, to achieve a high score on the alcohol use construct, a respondent had to be both a frequent drinker and also demonstrate evidence of social, behavioral, or instrumental impairments indicative of alcohol abuse (National Institute on Alcohol Abuse and Alcoholism, 1990).

In this report, we examined targets' alcohol use measured in the first year of the study and again in the study's fourth year. We considered siblings' alcohol use measured in the first year of the investigation. Internal consistency for these measures was above .90 in all but two cases. The two exceptions were target's frequency of use at time one (α = .71) and target's alcohol problems at time four (α = .77).

Harsh/Inconsistent Parenting to the Target. We examined two important dimensions of parenting behavior: parental management strategies and the emotional valence of parenting behavior. Management strategies that we expected to relate positively to adolescent alcohol use included inconsistent disciplinary practices and poor monitoring or tracking of adolescent activities. Regarding the emotional quality of parenting, prior research shows that when parenting takes on a hostile and/or critical quality, adolescents are at greater risk of substance use (Barnes, 1990; Conger et al., 1991; Hawkins et al., 1992). We, therefore, identified three indicators of harsh/inconsistent parenting toward the target child: (a) hostility, (b) inconsistent discipline, and (c) poor child monitoring.

To capture the full diversity of each parent's harsh and inconsistent parenting, we aggregated information across reporters as suggested by previous studies (Rushton, Brainerd, & Pressley, 1983; Schwarz, Barton-Henry, & Pruzinsky, 1985). In the study's second year, four reporters provided information for each indicator of parenting behavior. Parents reported on their own and their spouses' behavior. The target child reported on each parent's behavior, and, finally, videotape observers rated each parent's childrearing behavior. For child management items, the scale for parents' self-report items and the child-report items ranged from 1 = *never* to 5 = *always*. For parents' hostile emotions, parents and adolescents reported on a scale that ranged from 1 = *never* to 7 = *always*. The spouse reports for all behaviors were given using a scale ranging from 1 = *strongly disagree* to 5 = *strongly agree*. Observers rated each parent's behavior during the first interaction task using a scale that ranged from 1 = *not at all characteristic* of the parent to

5 = *mainly characteristic* of the parent. In all cases, informants' responses were summed and correlations among resulting indexes were examined. All correlations were statistically significant ($p < .05$) and warranted summing across respondents. Thus, for each indicator described later, all responses were standardized and summed. Additional details regarding the construction of these measures can be found in Conger, Rueter, and Conger (1994).

The first indicator of harsh and inconsistent parenting measured the amount of *hostility* directed toward the target child. Each parent answered four questions asking how often in the last month they had (a) gotten angry at, (b) criticized, (c) shouted or yelled at, or (d) argued with their child. Each parent also responded to a single item asking if his or her spouse "gets angry with the children too often." The target child responded to a series of 12 items for each parent. For example, children were asked how often each parent got angry at them, criticized them, hit them, insulted them, and so on. Finally, three observational rating scales were used to measure parental hostility. Observers rated the extent to which each parent displayed (a) hostile, (b) threatening, and (c) insensitive behavior toward the target child. Interobserver reliability was .62 for fathers and .60 for mothers. Internal consistency for the summed indicator was $\alpha = .82$ (fathers) and $\alpha = .83$ (mothers). The observer ratings for the hostility indicator were based only on family interactions occurring during task 1.

The measure of *inconsistent discipline* was constructed in a manner similar to the hostility indicator. Parents responded to four questions. For example, parents were asked how often they allowed the child to get out of doing something he or she had been asked to do and how often they disciplined the child for something one time but not for the same thing at another time. To gather the child's point of view, we asked each target child to respond to the same four items with respect to each parent's behavior. Each parent was also asked three questions about his or her spouse's disciplinary practices. Like the self-report items, each parent was asked if his or her spouse is consistent in applying discipline, if the spouse is clear about expectations (reverse coded), and if the spouse allows the child "to do too many things he or she should not do." Observers, using a single observational code, rated each parent on these aspects of parenting. The interobserver reliability coefficients were .61 (fathers) and .72 (mothers). Internal consistency for the father's summed indicator was α = .67 and α = .65 for the mother's indicator. Observer ratings of discipline were based both on behaviors occurring during the interaction task and on family members' descriptions during the task of parent practices at home. For example, if both parents and children agreed that the father did not discipline in a consistent fashion when these adolescents broke rules at home, for example, regarding curfews, then the father was rated high on inconsistent discipline.

The third indicator of harsh and inconsistent discipline was *poor child monitoring*. Parents were asked how often they (a) know where their child is, (b) know who the child is with, (c) talk to the child about events in his or her life, and (d) have a set time for the child to be home or in bed. The target child also answered the same four questions about each of his or her parents. Parents were also asked if their spouses know what the child is doing and who his or her friends are, as well as if their spouses know the child's teachers and how well he or she is doing in school. Finally, observers rated each parent in terms of how well the parent knew the child's day-to-day activities, his or her friends, school activities, and so on (interobserver reliability was .51 for fathers and .51 for mothers). For fathers, internal consistency was .70. Internal consistency for the mother's indicator was .63. As with the discipline measure, observer ratings of monitoring were based both on behaviors occurring during task 1 and on family members' descriptions during the task of parents' monitoring behaviors at home.

Friends' Alcohol Use. In developing the measure of friends' alcohol use, we took into account the possibility that an association between this variable and the target's own drinking may be due, at least in part, to a perceptual bias (e.g., if the adolescent drinks, he or she thinks or rationalizes that others drink as well). To offset this possibility, we gathered information on the target adolescent's friends' use of alcohol from both the targets and their siblings. During the study's third year, the target adolescent was asked how many of his or her friends (1 = *none of them* to 5 = *all of them*) "used alcohol" and how many had "gotten drunk using alcohol." Responses to these two items were highly correlated (r = .88) and were summed to create the *target report* indicator of friends' alcohol use. During year 3, the sibling also was asked if the target's "friends drink or smoke a lot" (1 = *strongly disagree* to 5 = *strongly agree*). This single item became the *sibling report* of friends' alcohol use.

RESULTS

Correlational Analyses

Table 1.1 presents the correlations (decimal points omitted), means, and standard deviations for all study variables used as indicators of constructs in the evaluation of the theoretical model. Correlations above the diagonal are for models involving fathers, those below the diagonal are for analyses involving mothers. In general, the zero-order correlations are consistent with the theoretical model. For example, the indicators for mother's history of substance use problems are positively related to indicators for harsh/inconsistent parenting (e.g., $r = .14$, $p < .01$, for the relation between mother's history of drug use and hostility toward the target child. The same correlation for father's is .22, $p < .01$).

Table 1.2 presents the intercorrelations among constructs in the model. These correlations are based on estimates of the constructs using multiple indicators (e.g., friends' alcohol use is operationalized with two indicators, one involving target and the other sibling report). Consistent with the results for correlations between specific indicators, parent history of substance use correlated .33, $p < .001$, with mother's parenting (below the diagonal) and .36, $p < .001$, with father's parenting (above the diagonal). In addition, there were the expected positive correlations between target alcohol use at time 4 and earlier harsh/inconsistent parenting, earlier target drinking, sibling drinking, and friends' alcohol use. Because LISREL 7 (the software package used to generate these correlations) does not estimate the statistical significance of correlations between constructs, significance tests are not reported in Table 1.2.

Structural Equation Models

Latent-variable structural equation models were used to examine the empirical credibility of the proposed theoretical processes (Figure 1.1). Maximum likelihood estimates of the model coefficients were obtained using LISREL 7 (Joreskog & Sorbom, 1989). Models were first estimated separately for mothers and boys, mothers and girls, fathers and boys, and fathers and girls. Because there were no significant gender differences based on adolescent sex, we combined the boys and girls in the

TABLE 1.1 INTERCORRELATIONS, MEANS AND STANDARD DEVIATIONS FOR ALL STUDY VARIABLES (INDICATORS FOR CONSTRUCTS): MOTHERS (N=371) BELOW AND FATHERS (N=368) ABOVE THE DIAGONAL

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	*M*	*SD*
Parent History of Substance Use																
1. Alcohol	27	30	06	11	06	02	13	09	14	12	04	08	09	2.60	1.41	
2. Drugs	52		22	03	06	00	-05	22	06	09	08	08	-02	09	2.67	1.30
3. Tobacco	39	43		-06	00	-01	03	15	11	08	04	00	03	01	3.64	1.52
Sibling Alcohol Use (T1)																
4. Frequency	04	09	11		78	15	18	04	11	07	18	29	15	11	.96	1.75
5. Problems	09	15	12	77		13	21	04	14	08	20	31	19	19	5.70	7.28
Target Alcohol Use (T1)																
6. Frequency	15	13	12	15	13		62	15	10	12	23	20	21	22	.52	1.13
7. Problems	19	14	07	18	21	61		09	07	09	20	17	25	24	4.66	6.14
Harsh/Inconsistent Parenting to Target (T2)																
8. Hostility	06	14	10	02	00	11	09		44	38	09	15	06	08	.06	2.23
9. Inconsistent Discipline	10	19	08	14	18	16	16	48		43	15	13	11	11	-.07	2.57
10. Poor Child Monitoring	12	25	18	05	12	07	09	40	45		13	20	02	01	-.08	2.54
Friends' Alcohol Use (T3)																
11. Target Report	14	20	16	18	20	22	20	16	17	16		46	54	52	3.76	2.00
12. Sibling Report	11	09	11	29	30	20	17	17	17	23	46		33	27	1.81	1.02
Target Alcohol Use (T4)																
13. Frequency	17	18	19	15	19	19	24	10	16	15	53	33		78	2.36	3.00
14. Problems	17	17	24	11	18	20	23	13	17	16	50	27	78		12.56	2.87
M	1.90	2.66	3.04	.95	5.65	.51	4.59	.01	-.05	-.02	3.74	1.81	2.33	12.52	—	—
SD	.99	1.07	1.43	1.75	7.27	1.12	6.12	2.28	2.52	2.37	1.97	1.02	2.97	2.76	—	—

Note: For $r \geq .10$, $p < .05$; decimal points omitted; T1 = year 1 of the study, T2 = year 2, and so on.

Table 1.2 Intercorrelations Among the Theoretical Constructs: Mothers below and Fathers above the Diagonal

	(1)	(2)	(3)	(4)	(5)	(6)
1. Parent History of Substance Use		.13	.03	.36	.13	.04
2. Sibling Alcohol Use (T1)	.20		.24	.09	.34	.19
3. Target Alcohol Use (T1)	.26	.25		.20	.31	.34
4. Harsh/Inconsistent Parenting to Target (T2)	.33	.09	.23		.31	.12
5. Friends' Alcohol Use (T3)	.20	.31	.33	.37		.46
6. Target Alcohol Use (T4)	.14	.18	.32	.25	.51	

Note: T1 = year 1 of the study, T2 = year 2, and so on.

following analyses. We estimated the models separately for mothers and fathers because of some interesting differences in the findings.

In Figure 1.2, which presents the results for mothers, we first estimated the relationship between target alcohol use at time 4 (the 10th grade) and the exogenous variables (mother's history of substance problems, sibling alcohol use at time 1, and target adolescent alcohol use at time 1). As expected, the target adolescents demonstrated continuity in their use and abuse of alcohol as indicated by the significant standardized path coefficient (.27) from time 1 to time 4. In addition, mother's history significantly predicted increasing risk for target use (.20), as did sibling drinking (.13). That is, these risk factors within the family predicted later drinking by the target adolescents above and beyond their initial behavior. Moreover, mother, sibling, and target adolescent substance use were positively and significantly intercorrelated at time 1 (e.g., $r = .27$, $p < .01$, between sibling and target drinking).

This initial step in the analyses demonstrates significant direct relationships between the exogenous variables in the mother model and later target drinking behavior, with the impact of each variable an estimated net of the effects of the other two. These results are important in that the elimination of these significant direct paths by the introduction of the postulated mediating variables (harsh/inconsistent parenting and friends' substance use) would provide support for the hypothesized mediating processes. The goodness-of-fit index (GFI = .988) reported in Figure 1.2 also suggests a reasonable fit between this initial model and the data, as does the Critical N (CN = 557), which needs to be greater than 200 (Bollen, 1989). In addition,

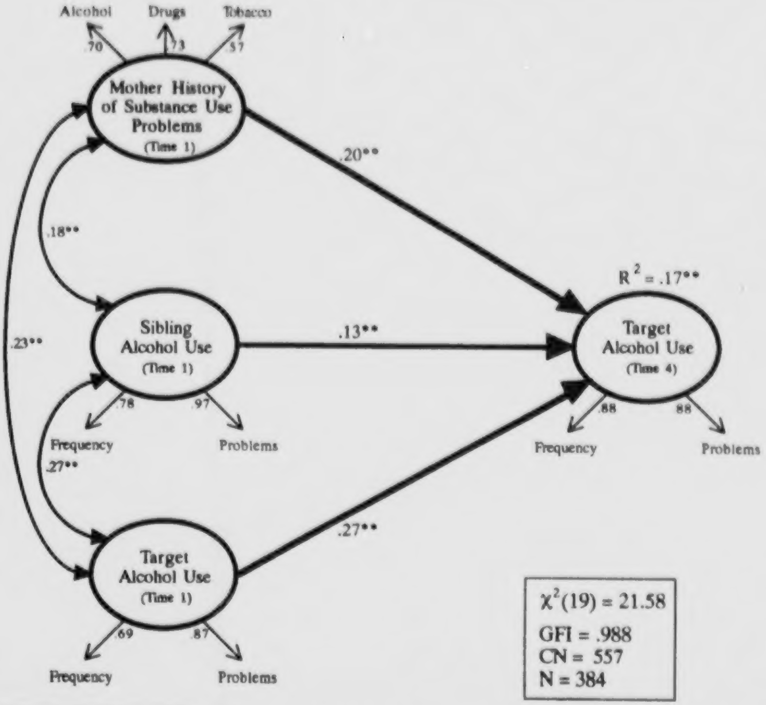
Alcohol
Drugs
Tobacco
.70
.73
.57
Mother History of Substance Use Problems (Time 1)
.20**
.18**
R² = .17**
Sibling Alcohol Use (Time 1)
.13**
Target Alcohol Use (Time 4)
.23**
.78
.97
Frequency
Problems
.88
.88
Frequency
Problems
.27**
.27**
Target Alcohol Use (Time 1)
.69
.87
Frequency
Problems
χ²(19) = 21.58
GFI = .988
CN = 557
N = 384

FIGURE 1.2 The direct effects model for mothers, maximum likelihood estimation of standardized regression coefficients.

Note: Because this model includes study variables from only Times 1 and 4, there are fewer missing cases and the total *N* increases to 384 (compared to 371 in the full model). + p < .10; * p < .05; ** p < .01.

all indicators were significantly related to their constructs, and this was true for all models tested in the following analyses.

Figure 1.3 reports the results of the initial model for fathers. As was the case for the mother model, the standardized regression coefficients show that both early target use (.31) and sibling alcohol use (.13) significantly predicted drinking behavior in the 10th grade. Father's history of substance use problems, however, was only marginally related to later target alcohol use (.09). Moreover, father's history of substance use was not significantly related to target drinking at time 1, contrary to the findings for mothers. The fit indexes suggested a good match between the model and the data.

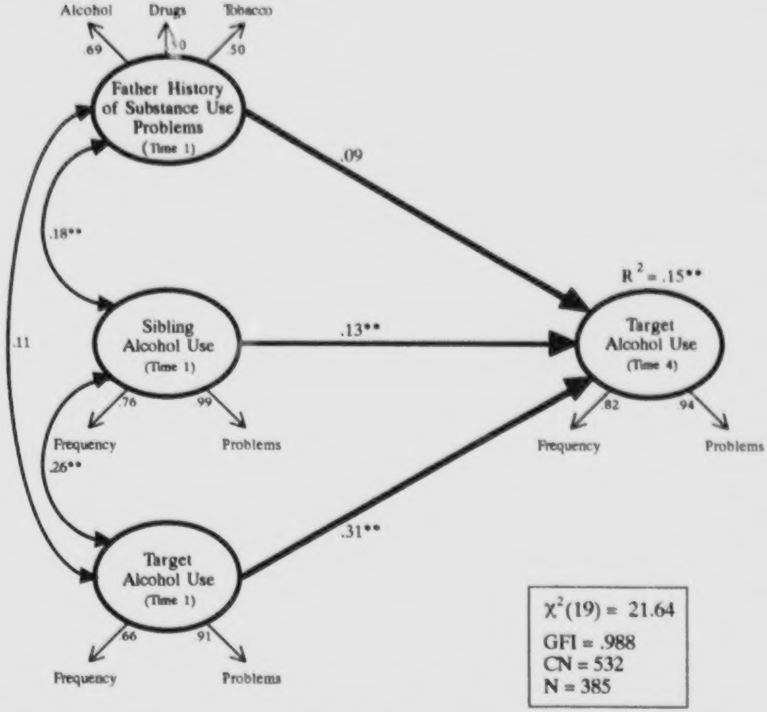
Alcohol
Drugs
Tobacco
.69
.50
.50
Father History of Substance Use Problems (Time 1)
.09
.18**
.11
R² = .15**
Sibling Alcohol Use (Time 1)
.13**
Target Alcohol Use (Time 4)
.76
.99
Frequency
Problems
.82
.94
Frequency
Problems
.26**
.31**
Target Alcohol Use (Time 1)
.66
.91
Frequency
Problems
χ²(19) = 21.64
GFI = .988
CN = 532
N = 385

Figure 1.3 The direct effects model for fathers, maximum likelihood estimation of standardized regression coefficients.

Note: Because this model includes study variables from only Times 1 and 4, there are fewer missing cases and the total *N* increases to 385 (compared to 368 in the full model). + p < .10; * p < .05; ** p < .01.

The next stage in the analyses considered the fit between the full model (Figure 1.1) and the data. Consistent with the hypothesized causal processes, the findings reported in Figure 1.4 show that mother's history of substance use problems significantly predicts harsh/inconsistent parenting, as does time 1 target alcohol use. Separate analyses showed that, as expected, there was no significant association between sibling alcohol use and parenting toward the target adolescent. The findings support the idea that harsh parenting to the target adolescent is exacerbated specifically by that child's behavior rather than being a more general response to all children in the household. In addition, the results show that harsh/inconsistent parenting at time

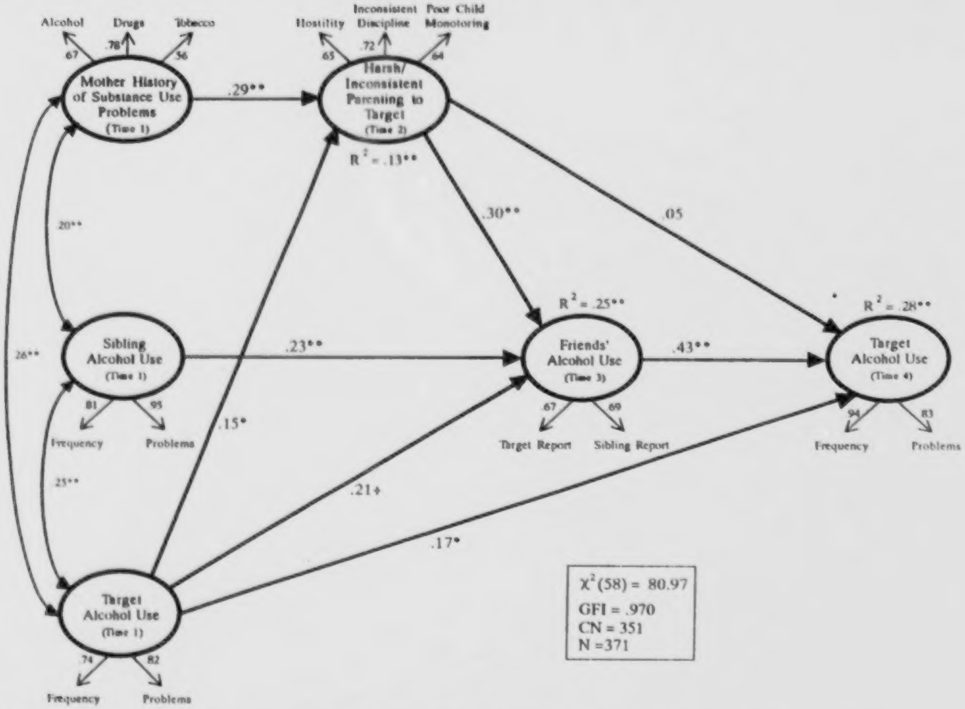
Alcohol
Drugs
Tobacco
.67
.78
.56
Mother History of Substance Use Problems (Time 1)
.29**
Hostility
Inconsistent Discipline
Poor Child Monotoring
.65
.72
.64
Harsh/ Inconsistent Parenting to Target (Time 2)
R² = .13**
.20**
.30**
.05
.26**
Sibling Alcohol Use (Time 1)
.81
.95
Frequency
Problems
.23**
R² = .25**
Friends' Alcohol Use (Time 3)
.67
.69
Target Report
Sibling Report
.43**
R² = .28**
Target Alcohol Use (Time 4)
.94
.83
Frequency
Problems
.15*
.25**
.21+
.17*
χ²(58) = 80.97
GFI = .970
CN = 351
N = 371
Target Alcohol Use (Time 1)
.74
.82
Frequency
Problems

FIGURE 1.4 Maximum likelihood estimation of the theoretical model for mothers, standardized regression coefficients.

+ p < .10; * p < .05; ** p < .01.

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2, sibling drinking at time 1, and target drinking at time 1 are all significant predictors of friends' drinking behavior at time 3.

As expected, separate analyses showed that sibling alcohol use did not predict later target drinking after friends' use was entered into the model, suggesting the existence of the postulated mediating effect. Moreover, the direct path from mother's substance use problems to friends' use was not statistically significant with the parenting variable in the model. Target's early drinking did relate directly to later alcohol use, but harsh/inconsistent parenting did not. Both sibling and parent influences appear to be indirect through their association with the acquisition by the target adolescent of friends who drink. In addition, the fit indexes suggest a good match between the proposed model and the data (GFI = .970).

The next stage in the analyses evaluated the fit of the data with the full model for fathers. As shown in Figure 1.5, the findings were quite comparable to those for mothers. Except for the direct path from parenting to time 4 alcohol use, the predicted relationships among constructs were all statistically significant. Moreover, parent and sibling effects were all indirect through the friends construct, that is, estimating the direct paths from these variables to time 4 target drinking with the friends construct in the model produced only nonsignificant findings. The results also demonstrate a good fit between the full model and the data (GFI = .972).

To complete the analyses, we examined the statistical significance of the indirect and total effects of the predictor variables on later constructs in the full model. The purpose of these analyses is to assure that postulated indirect effects are statistically significant. The results reported in Table 1.3 (mother's model) show, for example, that mother's history of substance use problems has a significant indirect effect on the target adolescent's involvement in friendships with peers who drink (.17, unstandardized regression coefficient) and on target adolescent drinking at time 4 (.22). Unstandardized regression coefficients are reported consistent with available software (LISREL 7).

For the mother model, the findings in Table 1.3 also show the expected indirect effect of sibling drinking on later alcohol use by the target adolescent. In addition, target alcohol use in the 7th grade had a marginally significant indirect effect (through parenting behavior) on later association with friends who drink (.07), and a significant indirect association with own alcohol use in the 10th grade (.40). Finally, harsh/inconsistent parent-

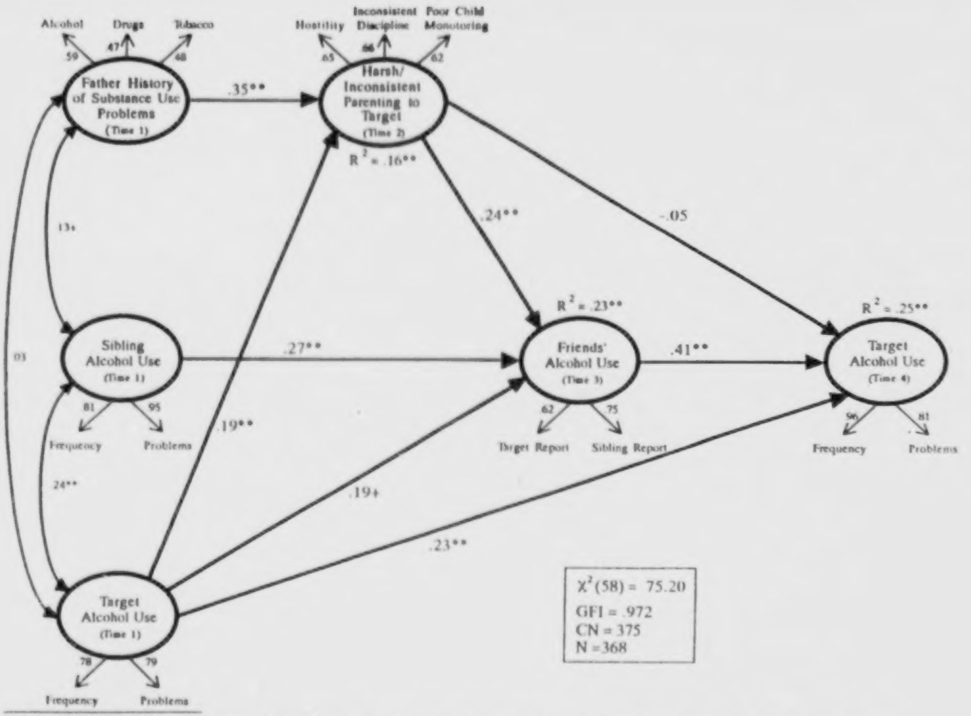
Alcohol
Drugs
Tobacco
59
47
48
Father History of Substance Use Problems (Time 1)
.35**
Hostility
Inconsistent Discipline
Poor Child Monitoring
65
66
62
Harsh/ Inconsistent Parenting to Target (Time 2)
R² = .16**
.13+
.24**
-.05
03
Sibling Alcohol Use (Time 1)
.27**
81
95
Frequency
Problems
.19**
R² = .23**
Friends' Alcohol Use (Time 3)
.41**
62
75
Target Report
Sibling Report
R² = .25**
Target Alcohol Use (Time 4)
96
81
Frequency
Problems
24**
.19+
.23**
Target Alcohol Use (Time 1)
78
79
Frequency
Problems
χ²(58) = 75.20
GFI = .972
CN = 375
N = 368

FIGURE 1.5 Maximum likelihood estimation of the theoretical model for fathers, standardized regression coefficients.

+ $p < .10$; * $p < .05$; ** $p < .01$.

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TABLE 1.3 INDIRECT AND TOTAL EFFECTS FOR THE PREDICTOR VARIABLES FOR THE MOTHER MODEL (UNSTANDARDIZED COEFFICIENTS)

	Predictor Variables									
	(1)		(2)		(3)		(4)		(5)	
Predictor Variables	Indirect Effects	Total Effects	Indirect Effects	Total Effects	Indirect Effects	Total Effects	Indirect Effects	Total Effects	Indirect Effects	Total Effects
1. Parent History of Substance Use										
2. Sibling Alcohol Use (T1)										
3. Target Alcohol Use (T1)										
4. Harsh/Inconsistent Parenting (T2)		.65**				.27*				
5. Friends' Alcohol Use (T3)	.17**	.17**		.21**	.07·	.41*		.27**		
6. Target Alcohol Use (T4)	.22*	.22*	.19**	.19**	.40*	.95**	.25**	.34**		.92**

Note: $^{\cdot}p < .10$; $^{*}p < .05$; $^{**}p < .01$; T1 = year 1 of the study, T2 = year 2, and so on.

ing had the expected indirect relation with target drinking through its association with deviant peers (.25). The findings reported in Table 1.4 for fathers are essentially the same as for mothers with one important exception; there was no significant indirect effect of fathers' substance use problems on later target drinking.

DISCUSSION

In this chapter we attempted to trace a set of social influences from family processes to peer relations that was hypothesized to increase risk for adolescent drinking and drinking problems during the transition from early to middle adolescence. The model that guided the study proposed that, over time, family influences on adolescent alcohol use give way to the direct effects of friends on the tendency to drink prior to reaching the legal age for that behavior. According to the theoretical model, the long-term consequences of family risks for involvement with alcohol are realized primarily through sibling and parent activities that legitimize, encourage, or fail to inhibit association with friends who will act as models and, perhaps, as sources of social pressure to drink. This report specifically addressed the usually neglected role of siblings in family influences on drinking behavior (Barnes, 1990).

Sibling Relations

In general, the results were consistent with the model. Considering first the role of siblings, the findings supported the hypothesis that frequent and problematic drinking by siblings would exacerbate the target adolescent's tendency to drink. The data demonstrated the role of siblings in this risk process in two ways. First, sibling drinking at time 1 was positively and significantly related to target drinking during the same time period. This outcome, of course, likely represents reciprocal influences between the two adolescents. Such bidirectional effects are consistent with our notion that alcohol use by a near-age sibling is a risk factor for adolescent drinking. Indeed, Lauritsen (1993) has shown that younger as well as older siblings tend to promote one another's deviant activities.

TABLE 1.4 INDIRECT AND TOTAL EFFECTS FOR THE PREDICTOR VARIABLES FOR THE FATHER MODEL (UNSTANDARDIZED COEFFICIENTS)

	Predictor Variables									
	(1)		**(2)**		**(3)**		**(4)**		**(5)**	
Predictor Variables	**Indirect Effects**	**Total Effects**	**Indirect Effects**	**Total Effects**	**Indirect Effects**	**Total Effects**	**Indirect Effects**	**Total Effects**	**Indirect Effects**	**Total Effects**
1. Parent History of Substance Use										
2. Sibling Alcohol Use (T1)										
3. Target Alcohol Use (T1)										
4. Harsh/Inconsistent Parenting (T2)		.61**				.32**				
5. Friends' Alcohol Use (T3)	.13*	.13*		.24**	.07+	.34+		.21**		
6. Target Alcohol Use (T4)	.05	.05	.22**	.22**	.29	1.03**	.19*	.09		.95**

Note: +p < .10; *p < .05; **p < .01; T1 = year 1 of the study, T2 = year 2, and so on.

Across time, the sibling role appears to change inasmuch as sibling drinking is directly related to target's selection of friends who drink, but only indirectly related to later target drinking through involvement with deviant peers. This sequence of relationships was predicted by the theoretical model. The important point generated by these findings is that siblings appear to have both a concurrent, direct effect and a delayed, indirect effect on a brother's or sister's risk of becoming a heavy drinker. As suggested by Barnes (1990), social influences involving sibling relations within the family appear to generalize to the outside social world as adolescents select into peer groups that maintain these problematic social conditions. We suspect that alcohol-using siblings legitimize in some important ways their brothers' and sisters' association with friends who drink. Future research should examine the possibility of specific legitimizing mechanisms. Moreover, further analyses are needed to determine whether sibling and peer drinking reciprocally affect each other and whether this dynamic involves both direct and indirect effects on adolescent behavior for both siblings and peers.

Deviance Amplification

As expected, the seventh-grade target children also contributed to this selection process. Indeed, early drinking appeared to exacerbate or amplify other dimensions of social risk. For example, target adolescents who were drinking in the seventh grade were more likely to acquire friends who drink, as reported both by themselves and their siblings. This "flocking" phenomenon may represent the frequently observed tendency for individuals to select friends with interests and dispositions similar to their own (Gottfredson & Hirschi, 1990). The selection process may also involve rejection by more conventional peers who are not attracted by deviant activities such as serious involvement with alcohol at a relatively early age (14 or 15 years old). As Patterson and his colleagues (1992) suggested, selection into deviant peer groups may represent the end result of failures in meeting conventional standards for behavior as much as active seeking of such associations. Thus, risk processes within the family that exacerbate the tendency to drink may also inhibit the development of more conventional friendship ties that would promote more age-appropriate behavior.

Target adolescent drinking in the seventh grade also appears to generate more harsh and inconsistent behavior by parents, perhaps in response to the stress of dealing with early-onset deviant activities. As predicted, such behavior by parents was also associated with selection into groups of friends who drink. Thus, early drinking behavior by the target adolescents apparently helped to set in motion a set of social processes that increased risk for later drinking behavior and related problems. These indirect pathways that are related to early drinking appear to operate additively and independently of predicted continuity in deviant behaviors. That is, early drinking was directly related to later drinking by the target adolescents; however, sibling, parent, and friend characteristics had an influence on later drinking that was statistically significant and independent of such continuity.

These results are consistent with the idea that youngsters with problems are both victims and shapers of life conditions that promote problem behaviors (Sampson & Laub, 1993). The present findings suggest that family context certainly contributes to later risks for potentially injurious behavior, and also that early-onset risk taking by the adolescent intensifies this process. But what more can we say about the role of parents?

Parents' Behaviors

We proposed that parent history of substance use problems would be indirectly related to adolescent risk for later alcohol use. The findings were consistent with this hypothesis, although they were somewhat stronger for mothers than for fathers. Mother's substance use history was positively and significantly related to both sibling and target adolescent drinking at time 1, whereas father's substance use history was related only to sibling drinking during the first year of the study. For both mothers and fathers, there was a significant relationship between substance use problems and harsh/inconsistent parenting, but parenting behavior had no direct association with time 4 adolescent drinking with the friends' construct in the model. Parenting behavior, however, was directly related to peer associations. Finally, there was no direct relation between parents' substance use history and later target drinking when the hypothesized mediating variables were included in the analyses.

The results, then, are consistent with our thesis that a history of parent substance use problems can be treated as a source of stress that disrupts parenting behavior. These disruptions reduce parent effectiveness in controlling deviant activities, including involvement with friends who use alcohol. As predicted, the strongest proximal predictor of adolescent drinking in the 10th grade was associating with friends who use alcohol. These findings are consistent with our prediction that family influences on later risk operate primarily by helping to shape the outside social environment of the adolescent. It is this environment, we expect, that will play the most significant direct role in affecting adolescent behavior through high school and into the post-high school years.

But why did mothers' history of substance use problems have both the strongest concurrent and delayed indirect influences on adolescent drinking? We suggested elsewhere (Conger et al., 1994) that because serious substance problems among mothers are more rare than among fathers, they represent a more extreme form of deviant behavior. That is, mothers' involvement with substances may do more to legitimize such act-ivities than does fathers' use. It may also be the case that because mothers generally play a more significant role in early childrearing, their substance use has more negative influences prior to the seventh grade. The harmful consequences of these disruptions in maternal childrearing during the preadolescent years may just be beginning to express themselves at a time concurrent with the initiation of our study. Because our study began during early adolescence, we were unable to examine these earlier influences. Future research needs to address this question.

Denise Kandel (personal communication, 1993) suggested to us that the findings may also represent a prenatal influence. That is, if many of these mothers were using substances during pregnancy, these children may have directly participated in that use, creating a degree of psychological dependency that comes to the fore during adolescence. This hypothesis is also deserving of future study.

In any case, the results presented here demonstrate, across time, important connections among sibling, parent, and target adolescent drinking behavior. These associations identify several points in the risk process that might be targeted for intervention or prevention programs, such as the link between parent substance use and disrupted parenting behavior. The longitudinal nature of the study, along with the multiple-informant approach to measurement of key constructs, increases our confidence in the robustness of the findings. The generalizability of the results, however, remains to be established with different populations (e.g., rural as well as urban, minority as well as majority), with different age adolescents and children, and across longer periods of time. Nevertheless, the results to this point support our thesis that siblings need to be included in family studies of substance use. The behaviors of parents alone provide only an incomplete picture of the family processes that create risk for adolescent drinking problems.

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2

BROTHERS AND SISTERS IN MIDDLE CHILDHOOD AND EARLY ADOLESCENCE: CONTINUITY AND CHANGE IN INDIVIDUAL DIFFERENCES*

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The question of why some brothers and sisters get along well, and others dislike each other and continually fight, looms large for parents and clinicians, whether the children are preschoolers, of school age, or adolescents. Individual differences in sibling relationships are marked among children of all ages, and they are of real social and practical importance. For example, we know from Patterson's (1986) work that siblings play a shaping role in the development of aggressive behavior. Affectionate sibling relationships also can provide real support in the face of family conflict (Jenkins, 1992), and can foster the growth of social understanding (Dunn, Brown, Slomkowski, Tesla, & Youngblade, 1991). Until quite recently the focus of most sibling research was on the early childhood period, and much has been learned about the sources of influence on the quality of sibling relationships among young children (for reviews, see Boer & Dunn, 1992; Dunn & McGuire, 1992). In contrast, relatively little was known either about how the structure of sibling relationships in general changes as children grow up

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or about what factors are associated with these notable individual differences in the relationship in middle childhood and adolescence.

More recently there has been a welcome increase in studies of siblings in middle childhood and adolescence (e.g., Buhrmester, 1990, 1992). However, it is notable that, with the exception of the recent studies of Brody and his colleagues (Brody, Stoneman, & McCoy, 1992; Brody, Stoneman, McCoy, & Forehand, 1992), most of this research is cross-sectional in design and is concerned with normative changes in the structure and nature of the sibling relationship, rather than with individual differences. Changes in the balance of power between older and younger siblings—with an increase in more egalitarian relations during middle childhood—have been described (Buhrmester, 1992; Buhrmester & Furman, 1990; Vandell, Minnett, & Santrock, 1987). Increases in positive emotional tone and conflict between 8 and 11 were described by Vandell and her colleagues, whereas Buhrmester and colleagues reported a decline in companionship between 8 and 17 years and a decrease in emotional intensity.

Although this research is illuminating in terms of the broad developmental changes in the sibling relationship that take place as children undergo the developmental changes of middle childhood, it cannot begin to answer questions concerning the patterns of individual differences in sibling relationships over this time period. How far are such differences part of a pattern that has continued from early childhood? Do new factors become important as sources of influence on differences in siblings' relationships as the children reach middle childhood and early adolescence? This is a period that includes major changes in children's social and emotional lives, with the transitions of school and the formation of important peer relationships. Do these changes influence children's intimate relationships with their siblings?

We might well predict that there would be discontinuities in individual differences in the relationship over this period, in view of the changes in the structure of the relationship revealed by the cross-sectional research and the major changes in children's lives over this period. Starting and changing school can, for example, be a stressful experience for children (Dunn, 1988), and it is possible that children who find school experiences difficult may "bring their problems home" and become more irritable and difficult with their siblings. In addition to the normative life events of this period, such as starting school, for many children this period may entail major changes in family life such as parental separation, house moves, and parental unemployment. These changes may well influence changes in family relationships (Dunn, 1988). We know, for instance, that hostility in sibling relationships increases following parental divorce (e.g., Hetherington, 1988; MacKinnon, 1989). It is also quite possible that the developmental changes in children during this period, such as their growing understanding of others, their ability to engage in intimate self-disclosure, and their new social relationships outside the family, may also be linked to new patterns of individual differences.

In contrast, other arguments can be mounted to predict that we would find considerable continuity in the quality of sibling relationships during this period. It is known, for instance, that the temperaments of siblings and the quality of their relationships with their parents are important sources of influence on the relationship during the preschool period (Brody, Stoneman, & Burke, 1987; Munn & Dunn, 1989), among 4- to 7-year-olds (Stocker, Dunn, & Plomin, 1989), and indeed in middle childhood (Brody, Stoneman, & McCoy, 1992). We know, too, that patterns of family cohesion and emotional quality are linked to differences in sibling relationships (Brody & Stoneman, 1987; Brody, Stoneman, McCoy, & Forehand, 1992). Continuity in temperament, family emotional patterns, or differential parental behavior might all contribute to stability in individual differences in sibling relationships between early childhood and adolescence.

To answer the questions about the patterns of individual differences in the relationships, and the possible changes in factors that impact on the relationships, the most appropriate research strategies involve longitudinal studies. In this chapter I discuss the findings from a recent study in which a group of siblings was followed from the preschool period through middle childhood and early adolescence (Dunn, Slomkowski, & Beardsall, 1994). In the study a range of issues concerned with the relations between family relationships and sociocognitive development over this time period were investigated. Here my focus is on four themes concerning the sibling relationship. The first is the issue of stability in the quality of sibling relationships over this period; the second and third concern factors associated with changes in the relationships over this period, specifically the significance of life events and the changing significance of socioeconomic status and gender as the children reached early adolescence. Finally, the issue of what the family members themselves view as important contributors to change are discussed.

THE CAMBRIDGE SIBLING STUDY

The first visits to the 43 families participating in the study were made when the second-born children were 18 months old, and a series of observations and interviews with the mothers were made during the preschool period. During the second phase of the study, the families were revisited during the middle childhood period and early adolescence of the siblings; mothers and siblings were interviewed, and a variety of assessments were conducted. At this stage, 40 families were able to continue to participate (two families had emigrated, and one family dropped out). Full data on the sibling relationship were available for 39 families, and it is these data that are discussed in this chapter. Figure 2.1 gives an outline of the time points and focus of measurements on the relationship.

	Time 1	**Time 2**	**Time 3**	**Time 4**
Child Age (Years)	YS[1]:3 OS[1]:5-6	YS:6 OS:8-9	YS:8 OS:10-11	YS:10 OS:12-13
Sibling Relationship	a) Maternal Interview b) Observations	Maternal Interview	Maternal Interview	Maternal Interview Child Interview
Life Events		Maternal Interview	Maternal Interview	Maternal Interview Child Interview

[1]YS = Younger Sibling
OS = Older Sibling

FIGURE 2.1 Outline of visits and procedures.

The Families Studied

The study was conducted in Cambridge, England. The families, who were initially recruited from advertisements in the local newspapers and through the help of Health Visitors, came from the town of Cambridge and surrounding villages. All were Caucasian. The social class background, in terms of the Registrar General's (1973) classification of the occupation of the siblings' fathers, was as follows for the 39 families who were followed up till the last time point and for whom the measures on the sibling relationship were complete: I/II (professional/managerial) for 24 families, III (white collar) for 4 families, III (skilled manual) for 8 families, and IV/V unskilled manual for 3 families.

The age gap between the siblings was on average 26 months; thus the older siblings were on average 5 years old at time 1, and 8, 10, and 12 years old on average at the later time points. The design of the study enabled us to study the second-born children at the same ages that we had studied their older siblings as 8- and 10-year-olds; this makes it possible for us to begin to distinguish the significance of birth order and developmental stage. There were 9-girl–girl pairs, 8 boy–boy pairs, 11 girl–boy pairs, and 12 boy–girl pairs.

Procedures and Measures

The findings described concern the measures of sibling relationship from time 1 (when the second-born children were 36 months old and older siblings on average were 5 years old) and from times 2, 3, and 4. These measures are considered in relation to assessments of the life events that the families experienced, to the mothers' experience of stress and daily hassles, to the children's gender, and to the families' socioeconomic status. At the last time point, when the second-born children were 10½ and their older siblings were 12 to 13 years old, the siblings and their mothers each took part in an open-ended interview (alone) in which they were asked about their own views on the patterns of change and continuity in the sibling relationship. In view of the space constraints, I simply refer to the measures here and give references to sources where details of their design, validity, and reliability can be found.

Measures of sibling relationship. The *Maternal Interview Concerning the Sibling Relationship* (Stocker et al., 1989) (times 1, 2, 3, 4) has been employed in three different longitudinal studies; it includes 17 questions concerning each child's behavior toward the sibling. From these questions, scales are derived by principal components analyses; these reflect a positive and a negative dimension of the sibling relationship.

Observational measures of sibling interaction from unstructured home observations (Dunn & Munn, 1985, 1986a, 1986b, 1987) (time 1) were also used. From the observational record and transcript of the verbal interaction during the observation, two aggregate measures of sibling interaction are derived, one of positive and one of negative behavior toward the sibling.

Another measure, the Sibling Relationship Interview (SRI; Stocker & McHale, 1992) (time 4) was also used. From this 21 item interview with each child, in which the child uses a 1–5 scale to rate the frequency with which various feelings and behaviors occur, 3 scales are derived, namely, *warmth/affection*, *conflict*, and *rivalry*; an *intimacy* subscale was also included (McGuire & McHale, 1993, adapted from a measure developed by Blyth, Hill, & Thiel, 1982).

Finally, a retrospective, open-ended interview with mothers and siblings concerning the sibling relationship (time 4) focused on recall of changes in the sibling relationship.

Measures of Life Events. The maternal interview (times 2, 3, 4) was based on a Life Events Schedule (see Beardsall & Dunn, 1992, for details), which was based on the Newcastle Child and Family Recent Life Events Schedule (Goodyer, Kolvin, & Gatzanis, 1985; see also Dunn et al., 1994). The Child interview (time 4): Goodyer and Secher's (1992) Recent Life Events and Difficulties Schedule for Young Persons (see Dunn et al., in press) was also used, as well as Parenting Daily Hassles (PDH). Crnic and Greenberg's (1990) PDH scale measures parental perceptions about the minor daily hassles associated with parenting (see also Crnic & Booth, 1991).

Measure of Maternal Mood. We also used the Clinical Scale for the Assessment of Irritability (Snaith, Constantopoulos, Jardine, & McGuffin, 1978) (times 2, 3, 4). This self-report instrument has four subscales: Outward irritability, Inward irritability, Anxiety, and Depression.

RESULTS

Stability

To investigate the issue of how far there was stability or discontinuity in patterns of individual differences in the children's relationships with their siblings between the preschool and middle childhood periods, age-to-age correlations in the maternal interview accounts of the sibling relationship were first examined. Second, we analyzed the associations between observational measures of sibling interaction in the preschool period and later interview accounts given by both children and mothers of the relationship at the later time points. Details of these analyses and results are given by Dunn and associates (1994).

The results from the first approach showed that there were significant correlations between age points for both the positive and negative dimensions of the relationships. These correlations increased in size with the children's age and tended to be larger for the positive aspects of the relationship. For example, for the older siblings, correlations between 8 and 12 years were $r(39) = .72$ and .61 for the positive and negative dimensions respectively, $ps < .05$; for the younger siblings, the correlations between 6 and 10 years were $r(39) = .52$ and .31 for positive and negative dimensions, $ps < .05$.

It is interesting to note that for the older siblings, the correlations over the seven years between time 1 when the children were on average 5 years old and time 4 when they were on average 12 to 13 were significant [$r(39) = .49$ and .46 ($ps < .05$) for the positive and negative dimensions, respectively]. However, for the younger siblings, the correlations over the seven years between the 3-year and the 10-year assessment were not significant. This difference in the stability of the relationship quality between older and younger siblings could be related to the difference in the developmental period covered: It is possible that there is greater stability of individual differences once the children are 5 years old. Alternatively, it could be related to their birth order. It is possible, for instance, that mothers have more stable views on their first-born children's behavior to the second-born sibling than vice versa; it is also possible that first-born children have more firmly held and stable feelings about their younger siblings than vice versa. We were able to examine this possibility by comparing the correlations between the maternal assessments of the first-born at 8 and 10 years (times 2 and 3) and of the second-born at 8 and 10 years (times 3 and 4). The results showed the correlations were comparable in size, indicating that the lack of stability for the younger siblings between times 1 and 4 reflected the developmental period covered rather than the birth order of the children.

The second approach to the study of stability was to examine the associations between the observations made in the preschool period and the interview accounts given seven years later by children and mothers. Two general points were established by these analyses. First, on the issue of stability, some significant correlations between the observations and the later child interview accounts of the relationship were found, supporting the maternal interview results on stability. Second, the results highlighted the importance of the behavior of the *other sibling* during the preschool period to the sibling relationship measures at early adolescence. For instance, younger siblings' observed negative behavior at three years correlated [$r(39) = -.50$ ($p < .05$)] with the older siblings' accounts of their intimacy with their siblings seven years later. The results of this second approach, then, showed that the continuity over time found with the first approach did not simply reflect stability in the perceptions of the mothers, as the correlations in this second strategy cut across different sources of information. Most importantly, the evidence from multiple regression analyses showed that a significant contribution to the variance in the positive aspects of the preadolescents' relationships at time 4 was made by the preschool measures. There was evidence, for instance, that the behavior of the *other sibling* in the preschool period was related to the differences in the preadolescents' accounts of their feelings and behavior toward their siblings seven years later (for details of all these analyses see Dunn et al., 1994).

Although these correlational data provide evidence for continuity in the siblings' behavior and feelings about one another, there were for many sibling pairs changes in their relationship, especially changes in the negative aspects of the relationship. Of the many possible contributors to such changes, we consider here three: the impact of life events, gender, and SES.

Significance of Life Events

The second general issue to be discussed concerns the relation of life events experienced by the children over the years to the quality of their relationship with one another. The question of whether children's relations with their siblings remain stable in the face of such events has been explored in relation to divorce and marital conflict, but not in relation to other life events. The findings on divorce are not entirely consistent, with some studies indicating an increase in sibling conflict following divorce (Hetherington, 1988) and others reporting that some siblings are significant sources of support for one another (Jenkins, 1992).

The results of our study were consistent in showing that in the face of adversities, the children grew closer together with an increase in friendly, affectionate behavior. The occurrence of life events with negative impact was correlated over time with positive behavior shown toward the sibling and negatively correlated with hostile or unfriendly behavior to the sibling. Thus, maternal reports of negative life events were correlated with the younger siblings' accounts of greater intimacy with the older siblings, and child reports of negative life events were negatively correlated with children's accounts of their feelings of rivalry toward their siblings.

It is important to note that, in this sample, the occurrence of marital separation and divorce was relatively infrequent. Only 8% of the events categorized as moderate to severe in negative impact involved marital problems. It appears that different types of life events may well have different sequelae for children's sibling relationships. It will be important in future work to examine different categories of events separately for their potential impact on children's relationships. In addition to these major life events, we should also study the "daily hassles," or trying events that children undergo on a daily basis, because research has shown that for adults, such perceived minor stresses or "daily hassles" have important deleterious consequences (Kanner, Coyne, Schaefer, & Lazarus, 1981). We know, too, that mothers' experiences of daily hassles are linked to the quality of sibling relationships at the final time point of the study. In families in which mothers reported frequent daily hassles, the children reported less intimacy and warmth with their siblings (for younger siblings, $r(39) = -.44$, $-.49$, for intimacy and warmth, respectively, $ps < .05$; for the older siblings, $r(39) = -.27$, $-.20$, $ps < .05$). There were also positive correlations between frequency of hassles and mothers' reports of the negative dimension of the relationships between older and younger siblings ($r(39) = .35$ and $.30$ for older and younger siblings, respectively, $ps < .05$).

Given this evidence for associations between maternal experience of stressful hassles and poorer relations between siblings, it is not surprising that we also found correlations between assessments of maternal irritability and mothers' accounts of the negative dimensions of the relationship ($r(39) = .38$, .32 for older and younger siblings, respectively). Correlations with the children's own accounts of the relationship were in the same direction, although only 4 out of 32 correlations between measures of maternal mood and children's accounts of their warmth, intimacy, rivalry, and conflict with their siblings were significant at $p < .05$. Maternal outward irritability, for instance, was negatively correlated with siblings' accounts of intimacy ($r(39) = -.32$ and $-.38$ for younger and older siblings, respectively, $ps < .05$) and with younger siblings' accounts of conflicted relations with their siblings ($r(39) = .32$, $p < .05$).

Changing Significance of Gender and SES

Two other general themes raised by the findings from the study concern the changing significance of the children's gender for the quality of their relationship and the growing significance of the socioeconomic status of the family.

On gender, cross-sectional studies have indicated that by late middle childhood gender differences are apparent in sibling relationships. Buhrmester (1992), for example, reported that by this period, older sisters are more likely than older brothers to be in confiding relationships with their younger siblings. In the Cambridge Sibling Study, gender differences had not been found at an above-chance level in the preschool observations or in the interviews when the children were 6, 8, or 10 years old. However, by time 4, when the older siblings were on average 12 to 13 years old, the first-born boys reported less warmth and intimacy with their younger siblings than did the girls.

By this time point, SES differences were also apparent, although such differences had not been found at earlier time points in the study. By early adolescence, the first-born children from the higher SES families reported more warmth and intimacy with their siblings than the first-borns from the lower SES families. Their mothers, too, gave accounts of the relationships that paralleled these differences: No association between maternal interview accounts of the relationship and SES were found for the earlier time points of the study, but by time 4 lower levels of positive, friendly behavior to the sibling were reported for the children from the lower SES families. Moreover, great increases in negative behavior toward the sibling between times 2 and 4 were found for the children from the lower SES families.

The interpretation of these differences is, of course, problematic. One possibility is that the adolescents from the higher SES families were more articulate and forthcoming about their affection and closeness with their siblings because they were more at ease with the interviewer. However, the differences in the maternal interview assessments that were apparent by time 4 but not earlier, and the greater increases between times 2 and 4 in these maternal accounts of negative behavior cannot be accounted for by such an explanation.

Another possibility is that there were indeed less warm relationships and more negative feelings between the siblings in some of the lower SES families. Other studies have reported less cohesion among family members from lower SES families by the time that children reach adolescence (Newson & Newson, 1992). The sample in the Cambridge Sibling Study is obviously not ideal for distinguishing between these various possibilities; however, the general message from the results—that by early adolescence the social and economic circumstances of the family are beginning to impact the children's sibling relationships within the family—is one that deserves further research attention.

To What Do the Family Members Attribute Change?

At the last time point of the study (time 4), we interviewed each family member separately to obtain their own views on how the relationship between the siblings had developed over the previous years. These detailed interviews were illuminating in a number of respects, and they clarified and extended the findings on each of the issues outlined earlier.

On the matter of stability and change in the relationship, we asked the siblings and their mothers whether they thought there had been changes in the relationship—and if so, to what did they attribute the changes. Three issues in particular that they raised were of general developmental interest. First, in many of the families negative changes in the relationship between the siblings were attributed by all three family members to the new friendships that the children formed outside the family during middle childhood—particularly after the transition to junior school, which takes place in England around the age of 8 years. In 29 of the 39 families, friendships were seen as contributing either to increased jealousy or to decreased closeness and warmth between the siblings.

The second point is that this association between new friendships and poorer or more distant relationships between the siblings was especially marked with first-born boys. The lack of warmth and intimacy in the sibling relationship that these boys described was frequently attributed to the ties that the boys had, by 12 or 13 years, formed with a male peer group outside the family; it was especially clear in those families in which the first-born boy had a younger sister.

A third issue that the family members raised concerned the developmental changes in the second-born children. For instance, 31 of the children considered changes in their sibling relationships to be related to increases in the second-born's growing powers of argument and reasoning and his or her increased assertiveness. Similar numbers thought that the development of different interests by the two siblings had led to a cooling or distancing of the relationship. Again, the period of the transition to junior school was the age period that was most frequently cited in relation to these changes.

On the matter of the impact of life events, the interviews with the children and their mothers were also illuminating. The majority of the children described how their siblings had provided support for them in the face of difficulties such as accidents that they had suffered, maternal illness, or problems that they had experienced at school. These comments were unsolicited and were not made in response to direct questions concerning sibling support.

CONCLUSIONS AND FUTURE DIRECTIONS

There was evidence for considerable stability in these children's behavior and feelings toward their siblings over the seven years they were studied, particularly for the older siblings in the period between 5 and 12 to 13 years. However, there were also changes for many dyads in the relative friendliness or hostility between the siblings that the family members reported. In the face of life events with negative impact, for example, the siblings drew closer to one another and showed support.

There were also changes in the factors that were associated with the individual differences in the relationships: Notably, the gender of the siblings became important in accounting for variance by the time that the children reached 12 to 13 years, as did the socioeconomic status of the family. The implication that the social world outside the family becomes more important as an influence on children's intimate relationships within the family is clearly one of importance.

Given the relatively small sample of siblings studied here, we clearly have to be wary of generalizing from these findings until they are replicated in other studies. The results do, however, highlight a number of issues for future research that merit further study.

First, in general terms it will clearly be useful to have more research on siblings during middle childhood and adolescence. The interviews showed that for many children, their relationships with their siblings are important in this period, a source of support or irritation and distress.

Second, some of the issues raised by the findings in this study clearly need to be investigated further. The matter of how friendships and extrafamilial relationships are linked to the development of differences in sibling relationships, for instance, merits more attention. So, too, do the findings on the significance of socioeconomic status. What, for instance, are the social processes within the family that might explain the association between socioeconomic status and the relationship between young adolescent siblings?

Third, there are many developmental questions that were not investigated in this study, but that are centrally important to an understanding of individual differences in sibling relationships. Perhaps the most important of all is the matter of the connections between other family relationships—parent-child and marital—and the sibling relationship. We remain ignorant of how the patterns of mutual influence among these family relationships develop and change as children grow through middle childhood and adolescence. The results described earlier show that the quality of mothers' well-being and experience of stress are importantly linked to differences in siblings' relationships at adolescence, but again we lack information on the social processes implicated. Given the evidence that siblings can be both shapers of aggressive behavior (e.g., Patterson, 1986) and significant sources of comfort and support for siblings faced with disharmonious parents (Jenkins, 1992), the importance of pursuing these exciting developmental questions with longitudinal research on siblings cannot be questioned.

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3

SIBLING RELATIONSHIPS IN MIDDLE AND OLD AGE

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My research has been concerned with the study of the relationship between siblings in the latter part of the life span and its effects on the siblings themselves. Although the topic of siblings in adulthood received relatively little research attention in the past, there has been increasing interest over the past decade. Before proceeding to present my own work, I begin this chapter with a review of the research of others, briefly citing my own work where relevant.

REVIEW OF SIBLING RESEARCH

Meaning of a Sibling Relationship

First, almost all sibling research has been done with full siblings, with little or no attention paid to half-, step-, adoptive, or fictive siblings. Given this situation, perhaps it would be wise to clarify the distinction between these types of siblings. Traditionally, *full siblings* are defined as two individuals who have both biological parents in common. *Half-siblings* are individuals who have only one biological parent in common. *Step-siblings* are individuals who have no biological parents in common, but who are linked by virtue of the marriage of a biological parent of one to a biological parent of the other (as in blended families following divorce and remarriage). *Adoptive siblings* are individuals whose sibling status is established when a child is legally adopted into a family. *Fictive siblings* are nonfamily members who have been accepted into the family as siblings based on desirability or custom rather than on the basis of blood ties or legal criteria. In some cultures fictive siblingship may be sentimental or honorary, but in other cultures (Cicirelli, 1994; Marshall, 1983; Weisner, 1989) fictive siblings have all the privileges and obligations of biological family members.

In the case of the relationship between full siblings, I propose the following definition: Sibling relationships are the total of the interactions (physical, verbal, and nonverbal communication) of two or more individuals who share common biological parents, as well as their knowledge, perceptions, attitudes, beliefs, and feelings regarding each other, from the time when one sibling first becomes aware of the other (Cicirelli, 1985a, p. 180). A sibling relationship includes overt actions and interactions between the sibling pair, as well as the covert subjective cognitive and affective components of the relationship. The implication is that sibling relationships can continue to exist when the siblings are separated by distance and time without ongoing sibling interaction. When one considers also that the full sibling relationship is a relatively egalitarian, ascribed relationship of very long duration in which the siblings share a biological heritage with from 33% to 66% of their genes in common (Scarr & Gracek, 1982), it becomes apparent that the relationship with a full sibling may be quite different from that existing with half-, step-, adoptive, and fictive siblings.

It may be necessary to adapt the definition of a sibling relationship to apply to each type, as the same definition may not apply to the different types. For example, some types of siblings may have a relationship of long duration with much contact, closeness, and commitment, whereas other types of siblings may have a purely formal relationship with little or no contact or interest in one another. Full siblings may feel a greater commitment to the relationship regardless of any disagreements or rivalries than do siblings of other types. Such considerations indicate the need to study other types of siblings and their relationships before generalizing any results from studies of full siblings to other types of siblings.

Methodological Problems in Studying Adult Siblings

The prevalence of incomplete sibling sets can be a serious problem in studies of older adults, as not all members of a sibling set survive from childhood on. Most individuals in the mid–old (ages 75–84) and old–old (ages 85 and older) groups have experienced the death of some members of their sibling set. It is also true that a greater percentage of deceased siblings of older people are men, so that if one studies sibling relationships in very late life, one may be studying the relationship between sisters who are the remaining members of their sibling sets.

A second and related problem in the study of sibling relationships involves determining which sibling dyad should be the unit of analysis. If one wishes to consider all sibling dyads for a given sample of subjects (e.g., 80 interviewees reporting on 240 sibling dyads), the dyads would not be independent. Furthermore, subjects with different numbers of siblings would be unequally represented in the overall data set. No good solution to this dilemma exists. One possible solution has been to select only one sibling per interviewee for use in the analysis, such as the first-born, the closest in age, or the one to whom the subjects is affectively closest. A variant on this approach is to randomly sample first-born, closest-in-age, and last-born siblings. However, it is not possible to apply such a criterion consistently when surviving sibling sets are incomplete. Another possible solution is to construct an average score representing all siblings in the family or all siblings of a given sex. However, if there is a large variation in the scores pertaining to the various siblings in a family, the use of an average score would be misleading.

Another concern centers on practical reasons for the paucity of sibling studies in middle and old age and the resulting limitations on sample representativeness. Sibling research in infancy, childhood, and adolescence is easier to do, as it typically is carried out either within the nuclear family setting or within school environments, making possible observation studies of face-to-face interaction, laboratory or field experiments, and longitudinal studies under stable conditions. However, in the latter part of the life span, siblings no longer live in the same household as they did in childhood and adolescence, making it not only more difficult to identify sibling pairs and to contact them, but also to bring them together to participate in any research project. One or both members of a sibling pair may be unwilling to participate, finding it threatening to reveal any information regarding themselves in relation to their siblings, feeling that such research is an invasion of their privacy or holding antiresearch attitudes. In the case of elderly siblings, some may be too ill, frail, or immobile to participate. Even if willing to participate, scheduling problems may be insurmountable. Such problems not only limit recruiting of samples but the types of data collection and research design that can be used, particularly in longitudinal studies. Observational studies or laboratory or field experiments may be totally unfeasible, forcing the researcher to depend on interviews and/or questionnaires.

As a result, the process of building up a body of knowledge about sibling relationships in middle and old age has been slower and has resulted in more gaps than desired. One consequence of the many limitations on research is the continuing need simply to establish the existence of certain phenomena in regard to sibling relations in middle and old age, further delaying the formulation of any theory regarding sibling relationships.

An emerging problem for the study of middle-aged siblings of the baby boomer cohort (and for the study of elderly siblings in the future) will be finding sufficient samples of full siblings reared in intact nuclear families to develop further the body of knowledge concerned with full siblings. Limiting studies to full siblings can be justified with the present older cohort because parental divorce and remarriage were not so common during the period in which they were reared. Given the divorce and remarriage rates of recent decades, the norm is slowly shifting to families composed of half-, step-, adoptive, and fictive siblings. In the future, studies involving only full siblings may become less important than those involving all types of siblings as socializing and helping agents across the life span.

Existence of the Sibling Relationship in Late Adulthood

Preliminary concerns of researchers studying older age groups were the extent to which, given death rates, older adults had surviving siblings and whether they maintained some kind of contact with those siblings in sufficient numbers to make the study of sibling relationships in later life a relevant topic. Findings of survey studies show that, for most older individuals, siblings do exist, maintain contact, communicate, and share experiences until very late in life (Cicirelli, 1979, 1980b, 1981; Clark & Anderson, 1967; Rosenberg & Anspach, 1973; Shanas, 1973; Shanas et al., 1968). Percentages of people over age 60 having at least one living sibling ranged from 78% for the Cicirelli sample to 93% for the sample reported by Shanas and associates; however, the Cicirelli sample represented the older portion of the age range more heavily than did the others. The same studies indicated that the majority of older people saw their siblings at least several times a year, and very few actually lost contact with each other. Step- and half-siblings, too, continue to keep in touch with each other in adulthood, although they see each other less often than do full siblings (White & Riedmann, 1992).

Older siblings communicate and presumably share experiences either by talking directly to each other about their diverse experiences or by communicating indirectly through a third person. Thus, even if siblings are not physically close enough to share and interpret the same environment in a similar manner, they may share and interpret their separate experiences indirectly.

Quality of the Sibling Relationship

Providing companionship constitutes an important function of sibling relationships in old age. Scott (1983) examined activities reported by siblings and others. Visits, reunions, and happy family occasions were the most frequent sibling activities reported, followed by various types of recreational activities (home, commercial, and outdoor), and by shopping, church attendance, and miscellaneous other activities. When proximity was controlled, frequency of these sibling activities compared quite favorably with similar activities with children. Various authors have found that most relationships in old age are companionate in nature (Adams, 1968, Cicirelli, 1982, 1985a; Johnson, 1982; Troll, Miller, & Atchley, 1978).

Early investigations of the quality of the sibling relationship centered around feelings of closeness and rivalry. Adams (1968) reported that a majority of young and middle-aged adults still felt close to their siblings, even though they were living independently. Despite reduced contact with their siblings, older adults report greater closeness with siblings than did younger cohorts (Cicirelli, 1980b, 1982, 1985a; Ross & Milgram, 1982). In addition to maintaining feelings of closeness, siblings tend to serve as confidants for one another in middle adulthood and old age (Connidis & Davies, 1990).

Sibling rivalry assessed through self-report measures, on the other hand, appears not only to be low throughout adulthood and old age but to be lower for older than for younger cohorts, with rivalry greatest between pairs of brothers and least between cross-sex siblings (Cicirelli, 1980b, 1985b). However, evidence from studies that used clinical interview techniques or projective methods (Bedford, 1989; Gold, 1986, 1989; Ross & Milgram, 1982) suggests an incidence of sibling rivalry in adulthood of up to 45%. Although Ross and Milgram's (1982) findings indicate that most rivalrous siblings seek to repair their relationships in later adulthood and old age, Bedford's (1989) work suggests that feelings of rivalry persist into old age. However, most older adults value their relationships with siblings and have developed ways of interaction that avoid conflict and overt rivalry. Not surprisingly, greater conflict was reported in relationships involving half- and step-siblings than in relationships between full siblings (White & Riedmann, 1992).

Although the general trend in sibling relationships in adulthood and old age appears to be one of greater closeness among older groups, investigations of changes in the sibling relationship following various life events found that the relationship was not a static one, but that it waxed and waned depending on the circumstances (Bedford, 1992; Connidis, 1992). Critical events influencing the sibling relationship involved marriage or divorce, changing interests, employment change, relocation to a new area, illness and death, behavior and achievement of children, family arguments, changing frequency of contact, and so on. Such changes may be positive for some sibling dyads and negative for others, depending on the circumstances. A sibling's marriage resulted in a less close relationship for a third of the sibling pairs studied by Bedford (1992; either the new spouse was not liked by the other sibling or the marriage disrupted the flow of a formerly close sibling relationship); for others, marriage to a spouse who was well liked brought siblings closer together.

Other researchers (Gold, 1989; Matthews, Delaney, & Adamek, 1989; Scott, 1990) have attempted to classify sibling relationships in adulthood and old age into a few distinct types. Gold (1989) identified five types, based on patterns of psychological involvement, closeness, acceptance/approval, emotional support, instrumental support, contact, envy, and resentment. *Intimate* siblings are characterized by unusually high devotion and psychological closeness (affection, empathy, self-disclosure); they place the sibling relationship above all others. *Congenial* siblings are close and affectionate, but place greater value on marital and parent–child relationships. *Loyal* siblings base their relationship on adherence to cultural norms; they support each other at special family events and crises and have regular but not frequent contact. *Apathetic* siblings have mutual disinterest and see each other little, but are not rivalrous or hostile; their lives have simply gone in different directions. Finally, *hostile* siblings have strong negative feelings toward each other, with considerable negative psychological involvement or preoccupation with the relationship. Gold found that 78% of the sibling relationships studied fell into the loyal, congenial, and intimate types, with the remaining 22% divided into the apathetic and the hostile types. This typology was given partial support by Scott's (1990) work, although she found that 95% of her sample fell into the first three types, with the remaining 5% apathetic. Matthews and associates (1989) classified the relationships between the middle-aged brothers they studied into four groups: the closely affiliated (very close to extremely close), the lukewarm (somewhat close to close), the disaffiliated (little or no closeness), and the disparate (disagreed about their level of affiliation).

Effects of Siblings on Well-Being

Because sibling relationships continue to exist throughout adulthood, there is an opportunity for continued influence of siblings on one another. One question that has been more extensively investigated is whether sibling relationships lead to greater well-being in old age. An early study (Cumming & Henry, 1961) found that older people with living siblings had higher morale. A large sample study carried out by Lee and Ihinger-Tallman (1980) failed to find a significant relationship between the frequency of interaction with the sibling seen most often and a measure of morale, when a large number of control variables were accounted for. McGhee (1985) confirmed the findings of Lee and Ihinger-Tallman with regard to the relationship between frequency of interaction and life satisfaction, but found that the mere availability of a sister was related to greater life satisfaction. O'Bryant (1988) found an overall relationship between older widows' interaction with married sisters and higher positive affect, although it appeared to depend on whether or not the widow's adult children provided expected support.

There are a number of situations when the sibling relationship becomes important in dealing with the mental health problems of the elderly (Cicirelli, 1988). Early conflicts and estrangements persisting from childhood or from the time of later critical incidents (Dunn, 1984), long-term sibling dependencies, or reactivated rivalries and aggressions can all come to necessitate therapy in old age.

Because siblings share a long and unique history, reminiscing about earlier times together is an activity in which siblings engage at many points in the life span, although it seems to become more frequent in old age. In later life, reminiscence becomes part of the life review process (Butler, 1963), in which past experiences are analyzed, evaluated, and reintegrated in relation to present events, values, and attitudes. Prompted by the realization of biological decline in later years, the life review allows the individual to resolve old conflicts and to achieve integrity in the latter portion of life. Butler's (1963) hypothesis that spontaneous reminiscence in the life review led to better adjustment in old age has been supported by a number of studies, at least for those elders who engaged in reminiscence because they valued the activity (Coleman, 1986; Molinari & Reichlin, 1985; Osgood, 1985). There is little research regarding reminiscence of specific sibling experiences. Ross and Milgram (1982) observed that sharing recollections of childhood experiences appeared to be a source of comfort and pride for the elderly, evoking the warmth of early family life and contributing to a sense of integrity that life had been lived in harmony with the family. Cicirelli (1985a) found that old people reminisced about old times more frequently with their siblings than with their adult children. Gold's (1986) elderly subjects reported that reminiscing about sibling relationships during the course of the interview helped them to put their current relationships with siblings into a meaningful context, helped them to understand present events, and helped them to appreciate the significance of sibling relationships in their lives. Sibling reminiscence may prove to be a valuable tool in therapeutic situations as well (Cicirelli, 1988).

The death of a sibling is a life event that nearly all individuals have experienced by old age. It can have far-reaching effects on the individual in childhood (Bank & Kahn, 1982a, 1982b), when it can be particularly traumatic because of its nonnormative nature and the child's lack of understanding. However, adjustment to sibling loss in old age is not necessarily easier. Moss and Moss (1986, 1989) found a heightened sense of personal vulnerability to death when a sibling died in adulthood, with a search for meaning and a sense of existential incompleteness in the family, as well as difficulties in renegotiating family relationships. In old age, almost half the survivors found the loss difficult for them, with the same themes found as in earlier adulthood.

Over all the areas of research reviewed thus far, relationships with sisters appear to be particularly important in old age, whether it is a sister–sister or a brother–sister bond. One could attribute this to women's greater interest in initiating and maintaining family relationships; however, Gold (1989) found that brothers initiated sibling contacts with sisters about as often as sisters contacted brothers. What seems more likely is that women's emotional expressiveness and their traditional roles as nurturers account for the importance of relationships with sisters (Cicirelli, 1989a).

Sibling Help in Old Age

Despite the fact that most older people say that they want to give tangible help to their siblings in time of need and also regard their siblings as a resource to be called on in their own need (Cicirelli, 1979, 1989a; Goetting, 1986), relatively few actually rely on a sibling for tangible help. Sibling help was regarded as most important when the brother or sister was ill, needed transportation, needed household repairs, or lost a spouse (Cicirelli, 1979; Goetting, 1986; Kivett, 1985; Lopata, 1973; Scott, 1983). Psychological support is a type of support for which siblings may be uniquely suited by virtue of their common values and perceptions (Avioli, 1989; Cicirelli, 1988; Dunn, 1985), and it appears to be freely exchanged.

Sibling help was greater among the oldest age groups (Cicirelli, 1979; Hoyt & Babchuk, 1983). Those who never married or who were widowed tended to receive more help from siblings (Johnson & Catalano, 1981). In addition, sisters were found to both give and receive more help (Gold, 1989), and Blacks and Whites tended to give different types of help (Suggs, 1989). When half- and step-siblings were involved, there was less help to one another in old age than occurred among full siblings (White & Riedmann, 1992). Gold (1989) found that when elders stopped providing help to siblings, it was because their own health had declined. Bedford (1989) suggested, however, that cessation of help to a sibling occurred when there had been no history of reciprocation of help from that sibling; this was particularly likely when the sibling was a brother.

Sibling Help to Elderly Parents

In addition to the help provided an older person's own siblings, the help provided by that person's adult children is an important source of support in old age. The helping behavior of the set of siblings in the adult child generation has also been studied.

The stereotypic model of help for elderly parents is that of one adult daughter who assumes the entire burden of providing help to elderly parents, with only occasional help from other family members. However, recent studies suggest that in many families, the adult siblings share parent care responsibilities more equitably.

Matthews and her colleagues (Matthews et al., 1989; Matthews & Rosner, 1988) examined the helping behaviors of the entire sibling subsystem. Pairs of sisters in a two-child family tended to share responsibility for both tangible help and moral support to their parents, with an almost equal division when both sisters were employed. In larger families, sisters tended to provide regular, routine help to the parents or to help in a "backup" capacity, whereas help provided by brothers tended to be limited to a few areas of male expertise, to be sporadic, or to be totally nonexistent. However, in families including only brothers, the brothers appeared willing to cooperate to meet the parents' needs for help. This finding was supported by the work of Coward and Dwyer (1990), who found that brothers from mixed-gender sibling networks provided significantly less help to parents than did their sisters, but that brothers from single-gender sibships provided approximately as much help as did sisters from single-gender sibships. Brody (1990), however, found that sisters provided more than twice as much help as brothers. In a recent study using data from the National Long-Term Care Survey, a given adult child's initiation or cessation of help to an impaired elderly parent was found to depend on the helping behaviors of that child's siblings, suggesting that the sibling group acted in concert and not as isolated individuals (Dwyer, Henretta, Coward, & Barton, 1992).

The findings of the various studies of the siblings in the adult child generation show considerable convergence despite the different methods used (Cicirelli, 1992b). The data clearly indicate that there is a great deal more support from siblings than has been generally recognized, particularly in cases in which a daughter has experienced marital disruption or is employed. Overall, sisters provide more help than brothers; sisters have a greater tendency to share help equally; and sisters and brothers tend to provide different types of help, structured according to traditional gender role norms.

Overall, one can conclude that an adult child's helping behavior to an elderly parent is influenced, at least in part, by the participation of the sibling network. Depending on the size and gender composition of the network, adult children in a sibling network may respond to an impaired parent with a cooperative group effort or the responsibility for helping may be left to only one or two of the siblings.

As one might suspect, considerable sibling conflict can occur when the help provided to a parent by various siblings is viewed as inequitable, with up to half of all families reporting some kind of conflict (Brody, 1990; Cicirelli, 1992a, 1992b; Matthews & Rosner, 1988). Conflicts centered around whether siblings were doing their fair share and around criticisms of one another's actual helping behaviors.

MY OWN SIBLING RESEARCH

Metatheoretical Orientation

A Metatheory for Guiding Research. Underlying my approach to research on siblings is a metamodel that I labeled Organicistic/Quasi-Contextualism. Basic to this metaphor is the sequential applicability of world views to different parts of the life span. It is my view that until late childhood or early adolescence, the Organicist metamodel is most appropriate, with its emphasis on genetic-maturational factors. When a certain biological threshold of growth is reached, Quasi-Contextualism emerges as the world view until late in life (approximately 85 years of age), when genetic-maturational factors emerge to control senescence. Organicism becomes the dominant metamodel once again for this segment of the life span (Cicirelli, 1993a, 1993b). This metamodel is an integration of a unidirectional and irreversible programmed theory of development and aging derived from Organicism, with a multidirectional and reversible approach to development and aging derived from Quasi-Contextualism.

Implications of the Metatheory for Sibling Research. What are the implications of this metatheory for studying sibling relationships in middle and old age? First, development and aging are relatively distinct concepts. Aging change is decremental, deteriorative change in the individual, with decreasing potential over time to reverse such change and with a concomitant decrease in adaptation to the environment. Thus, the study of sibling relationships in old age involves aging and perhaps dying individuals who have concerns about the nearness of death and death itself. At this stage of life, the researcher must deal with individuals who are becoming increasingly dependent on others and for whom siblings may be important as helping rather than socializing agents. Also, the sibling relationship itself may decline and suffer dissolution as deterioration of one or more members of the sibship takes place.

Second, the study of the commonality of changes in sibling relationships over time has as much priority as studying individual differences. The quality or lack of quality in their relationship may have as much to do with common events as with nonnormative events.

Third, structure may eventually regulate process in later years. Early in life, the reciprocal interaction between siblings changes the characteristics of the siblings themselves, which in turn influence their interactions, and so on. But eventually, after many years of interacting and communicating, characteristics of the siblings solidify and evoke stereotypic responses from one another. Previous research (Cicirelli, 1993a) found such stereotypic responding between adult children and elderly parents; by analogy the same may apply to elderly siblings. Cyclic changes or processes governed by a structure accumulated over many years seem to be typical. (This does not deny the existence of individual differences due to critical life events.) Thus, one might predict older siblings' relationships as well from input–output models as from input–process–output models.

Fourth, given the above thrust, subjective experience and intrapsychic functioning have priority over context (or concern with contextualizing the environment) in understanding the commonality of sibling relationships. However, and this is most important, such an approach is a matter of emphasis and partly related to the problems of old age, the difficulties of sampling and data collection in this time period, and the exploratory nature of existing research regarding this stage of life. It does not deny the importance of such concepts as systems, processes, contextualism, individual differences, reciprocal relations, and so on. The latter involve a complementary and essential frame of reference, given other objectives.

Adult Attachment Theory

My own research into sibling relationships in middle and old age has not been theory-driven; that is, no specific theory has guided the research. Rather, I have been more concerned with establishing the existence of certain phenomena in an uncharted territory. However, initial findings have stimulated me to adapt the adult attachment theory or model to apply to sibling relationships. Life-span attachment theory (Bowlby, 1979, 1980; Cicirelli, 1983, 1991) implies that the child's attachment to the mother or primary caregiver not only continues through the adult years but is the basis for the adult child's continued relationship with the parent as well as for helping behavior. Attachment is an ethological-adaptational theory rooted in evolutionary biology, incorporating such concepts as biologically determined development of social attachments and the adaptational value for survival of family members sharing a common gene pool (Lamb, 1988; Nash, 1988; Scarr & Gracek, 1982).

Briefly, attachment is an affectional bond that involves a desire to be physically close to a specific person (the primary caregiver or mother), leading to a system of attachment behaviors that lead to a goal of proximity, which in turn is associated with feelings of emotional security and comfort. Also, there is distress upon separation from the attachment figure and joy upon subsequent reunion (Ainsworth, 1989; Bowlby, 1979, 1980; Bretherton, 1992). To the extent that an infant finds or experiences comfort and security in the presence of the attachment figure, the infant forms a secure attachment and an "internal working model" or mental representation of that attachment figure as responsive and supportive. The hereditary predispositions of mother and infant initiate dyadic interactions between them, which in turn maintain the nurturing and attachment.

Attachment is not restricted to the mother (although this is typically the strongest bond); multiple attachments to other individuals who are responsive and supportive to the child (e.g., father, siblings) can also develop. Such mechanisms as conditioning and self-promoted feedback have also been suggested to account for the formation of these additional attachment bonds

(Gewirtz, 1976; Knudson, 1976). Various researchers have concluded that young children's behaviors toward their older siblings imply a sibling attachment (Bank & Kahn, 1982a, 1982b; Dunn & Kendrick, 1982; Stewart, 1983).

In adult attachment theory, these early attachments of the child to the mother and other family members are held to continue throughout most of the life course (Bowlby, 1979, 1980). Although few would deny that the adult individual has an affectional bond to a parent or sibling, for an affectional bond to be considered an attachment, it must fill several criteria: a need for proximity or contact with the attachment figure, distress or anxiety over separation or threatened separation, pleasure or joy upon reunion, grief at loss of the attachment figure, and feelings of security or comfort in the relationship with the attachment figure. Although not all adult sibling relationships meet these criteria, it is clear that many of them do. As the review of research demonstrated, most adult siblings do remain in contact, seek periodic visits, and find a sense of well-being in the sibling relationship.

An implication of an attachment relationship is that the attached individual seeks to protect the attachment figure, seeking to maintain the survival of the attachment figure and protect the emotional bond (Cicirelli, 1983, 1985a). This is evidenced by findings regarding elders' desire for sibling help and sibling psychological support in a crisis.

Empirical Research

My interest in the study of sibling relationships and sibling influence began in 1967 with the study of siblings in middle childhood, and led to the publication of some 15 articles and book chapters pertaining to this age group over the next decade.

My research into the sibling relationship in adulthood and old age began in 1977. Given the somewhat exploratory nature of adult sibling research, my own studies have focused on (a) the relation of sibling structure to the quality of sibling relationships in middle and old age and subsequent effects on well-being, (b) siblings as helping rather than socializing agents (either to help one another or to provide a coordinated effort to help elderly parents), and (c) formulation and use of an adult attachment model to account for the quality of sibling relationships, well-being, and helping behaviors.

My research into sibling relationships in middle and old age has been relatively limited in scope. A major reason for the limited scope is that, except for birth-order studies of eminence and studies of sibling contact, sibling research in middle and old age is more recent than studying siblings in infancy, childhood, and adolescence. Only within the past decade have researchers begun to take seriously the study of siblings in later life and to attempt to integrate findings throughout the life span. Another reason has been agencies' lack of interest in funding studies of sibling relationships in adulthood and old age, so that research on siblings becomes a secondary endeavor.

Existence of the Sibling Relationship. My early studies were concerned with the questions of whether older people had living siblings and whether they maintained an ongoing relationship with them. In an age-stratified sample of 300 older people and their adult children (Cicirelli, 1979, 1981), 85% of the middle-aged adults had at least one living sibling (88% had siblings in their birth families), compared to 78% of those over age 60. Looking at each age range more specifically, those in the 60–69 group reported an average of 2.9 living siblings, those in the 70–79 age group reported 2.2 living siblings, and those aged 80 and over reported 1.1 living siblings. These groups originally had averages of 4.6, 4.9, and 4.2 siblings, respectively, in their families of origin. Some 26% of the elders had a sibling living in the same city, and 56% had a sibling within 100 miles. Thus, most of the elders studied had living siblings, with the majority having some access to at least one sibling.

Some 17% of the older respondents saw the most frequently contacted sibling weekly or more often, whereas 33% saw the sibling at least monthly; the modal frequency of visiting was several times a year. Although the remainder saw their siblings less frequently, very few respondents actually lost contact with a sibling. In addition, the frequencies of telephoning were similar to frequencies of visiting (Cicirelli, 1979, 1980b).

Quality of the Sibling Relationship. A next step was to explore the quality of the sibling relationship in later life. In my early survey, 65% of older adults reported feeling close or very close to the most frequently contacted sibling (Cicirelli, 1979, 1980b). When cross-sectional age trends from late adolescence through adulthood and into old age were examined, mean closeness to siblings increased as age of the cohort increased (Cicirelli, 1985b). Similar cross-sectional age trends for feelings of sibling rivalry indicated a decline in rivalry reported by older cohorts.

Looking at sibling effects on elders' sense of well-being, I found that elderly men with sisters had a greater sense of emotional security than did those without them, whereas women with sisters were stimulated and challenged in their social roles (Cicirelli, 1977). Additionally, older people who had greater contact, closeness, and values agreement with their siblings had a more internal locus of control than those who did not; the number of brothers was associated with greater externality, whereas there was a tendency for the number of sisters (controlling for the number of brothers) to be related to greater internality (Cicirelli, 1980a).

In more recent work (Cicirelli, 1989a), I found that the perception of a close bond to sisters by either men or women was related to well-being, as indicated by fewer symptoms of depression, whereas a close bond to brothers seemed to have little relevance for well-being.

Shared family history and common language experiences should enable older siblings to practice an intimate communication style, with many shortcuts and implied meanings. However, such sibling communication has been little studied. When I asked elderly interviewees what topics they talked about with their siblings (Cicirelli, 1985a), most communication centered around the discussion of family events and concerns and around old times. In addition, I found that old people discussed old times more frequently with their siblings than with their adult children. The fewer the remaining siblings in the family, the greater the extent of the reminiscing. This indicates that siblings do play an important role in reminiscing. As the surviving members of their families of origin, siblings can use reminiscences of old times together to clarify events and relationships that took place in earlier years and to place them in mature perspective.

In a study of the elders' feelings toward dead siblings, I discovered that not only do feelings of closeness and rivalry persist, but these persisting rivalrous feelings were related to greater symptoms of depression among women with dead sisters (Cicirelli, 1989b).

Sibling Help in Old Age. In my early survey study (Cicirelli, 1979), relatively few elderly respondents reported depending on siblings as a primary source of support. Most help in families is exchanged in a vertical direction, with children (after the spouse) viewed as the primary source of support in old age. If the need for help becomes too great for the spouse or children to handle or if the normal scheme of family obligations is disturbed, siblings then tend to step in to give help. Indeed, some 60% of the elderly who were interviewed indicated that they would give help in a crisis, although only 7% (or fewer, depending on the type of help involved) regarded a sibling as a primary source of help. Surprisingly, sibling help became more important among the oldest age groups. If occasional and supplementary help had been considered in the study, the contribution of siblings would surely have been much greater.

Siblings' general readiness to give help was illustrated in my recent study of support from family members to hospitalized elders (Cicirelli, 1990), in which support from siblings was second only to support from spouses in certain areas of tangible help. Only about 20% reported receiving any kind of tangible sibling help while in the hospital, and only about 6% wanted or expected instrumental help from siblings when they returned home. In contrast, about half of the elderly patients interviewed wanted psychological support from their siblings, which they received in the form of visits and telephone calls.

In other work, the general hypothesis that the strength of the attachment bond between siblings is related to sibling interaction and psychological support in later life was investigated. In recent work, I found that sibling psychological support was related to an indicator of the strength of the attachment bond, with a stronger relationship when attachment to a sister was involved (Cicirelli, 1989a). In earlier work, a modification of the adult attachment model (Cicirelli, 1983, 1987) was tested in relation to such indicators of sibling psychological support in old age as offers to help, talking over problems, emotional support in a crisis, boosting morale, and adjustment to aging. Results of path analysis showed that the indicator of attachment had a direct and strong effect on psychological support, with a much weaker indirect effect through effects of attachment on visiting and telephoning.

In my analysis of longitudinal data from the National Long-Term Care Survey (Cicirelli, Coward, & Dwyer, 1992), only about 7% of impaired elders received help from siblings on a given measurement occasion. The provision of sibling help was associated with the number of the elder's impairments of instrumental functions and not impairments in basic activities of daily living, indicating that sibling help tended to be given in such areas as housekeeping, transportation, financial matters, and so on, rather than in areas involving direct personal care. Further, sibling help tended to go to those elders who had neither spouse nor children, supporting the concept of a substitution hierarchy of family helpers. The majority of sibling helpers continued to help over the 2-year period; those who ceased helping appeared to do so either because the elder's health had improved or because they themselves were older and perhaps in poor health. Gender and race were not associated with receiving help from siblings, failing to support earlier findings of Gold (1989) and Suggs (1989). One source of explanation is the differences in methodology between the studies. The National Long-Term Care Study determined only the presence or absence of help received from siblings, whereas Gold obtained a quantitative measure and Suggs determined frequency of help. Also, the former study focused on recipients of long-term care, whereas Gold and Suggs studied elders who were comparatively well. As a result, sibling help may have been more a matter of volition in the Gold and Suggs studies, whereas in the long-term care study, siblings felt compelled to give aid (regardless of the gender of the recipient) in a situation where no other family member was available.

An additional finding was that those elders who received help from siblings were younger on the average than those who did not receive such help. However, the maritally disrupted and the never married may experience impairment at a younger age than those who are married (Kasl & Berkman, 1981). Also, the siblings who provide help to impaired elders are themselves older and may have health problems of their own; thus, siblings may not be able to give help to those elders in the upper part of the age range, regardless of how much they might wish to do so. Both factors may play a part in accounting for the younger age of elders receiving help. Those elders who were older were more likely to report the cessation of sibling help over time; this is consonant with Gold's (1989) finding that older siblings stopped providing help because their own health had declined. Unfortunately, the study data did not enable us to determine whether such might be the case. The findings support the generalization that help from siblings comes when the elder has functional impairments that require help and when support from a spouse or adult children is unavailable for one reason or another.

Sibling Help to Elderly Parents. The helping behaviors of a set of adult siblings to their elderly parents has been a question of considerable interest to me, both in terms of how they shared the responsibility for parent care and the factors motivating their helping behavior.

In an early study (Cicirelli, 1984), I investigated the contributions made by siblings of the adult child who was considered by the elderly parent to be "closest" and the one to whom the parent turned first for help. Two groups of adult children were studied, those who had intact marriages and those who had experienced some form of marital disruption (i.e., divorce, widowhood, or remarriage). Adult children with intact marriages reported giving significantly more help to their elderly parents than did their siblings, whereas those with disrupted marriages reported giving about the same amount of help as did their siblings. In both cases, however, there were gender differences in the type of help provided, with sisters named more frequently as helpers with homemaking, personal care, home health care, transportation, and psychological support, and brothers named more frequently as helpers with maintenance, bureaucratic mediation, and protection.

In a more recent study of adult sibling helping networks (Cicirelli, 1992a), four patterns of sibling care sharing were identified, depending on the portion of the caregiving load assumed by the various siblings. The patterns and the percentages of families manifesting each pattern were: principal caregiver provides all care and siblings provide none, 5%; principal caregiver provides over half the caregiving load and siblings share the remainder, 55%; respondent provides more care than siblings, but no one provides over half of the caregiving load, 19%; and approximately equal division of caregiving load among all siblings, 21%. It must be remembered, of course, that respondents' egocentric bias will lead them to overestimate their own contributions in relation to those of their siblings (Lerner, Somers, Reid, Chiriboga, & Tierney, 1991). Despite the apparent inequities in caregiving contributions, only 37% of respondents felt that the division of caregiving responsibilities with their siblings was unfair, and only 22% failed to understand why certain siblings could not contribute to their parents' care. In about half of the families, all siblings coordinated their efforts in providing care to parents, whereas in about a fourth of the families there was partial coordination of sibling efforts, and in the remaining fourth of the families each sibling helped with care as he or she wished, independently of the others.

One important area of adult children's help to elderly parents is the making of decisions about the parent's care, especially when the parent is no longer able to make decisions autonomously. In a recent study of caregiving decision making, I asked first how decisions were currently made about the care to be provided to the parents, and then how decisions would be made when parents could no longer decide on their own (Cicirelli, 1992a). For current care, in only 17% of families did all siblings discuss specific caregiving tasks together; in 45% of the families, one or two of the siblings would decide things; in 22% of the families, the sibling who had specific abilities in an area made caregiving decisions in that area; in 8% of the families, whichever sibling happened to be on the scene made the decision; finally, in only 8% of families, the parent made the decision. Regarding future decisions in the event of the parent's incapacity, in 65% of the families all siblings would reach a consensus decision, and in the remainder of the families one or two siblings would make the decision.

In another portion of the same study (Cicirelli, 1992a), decision-making beliefs and caregiving decisions themselves were compared for two groups of caregiving daughters. The first group of daughters provided all or the majority of care needed by the parent, and the second group shared caregiving more equally with siblings. Beliefs about whether caregiving adult children should respect the parents' rights to make their own decisions autonomously and about whether adult children should make decisions paternalistically in the parents' behalf were measured. In addition, the daughters were asked about how decisions were made in 40 common caregiving areas. Although the two groups of caregiving daughters did not differ in their beliefs about autonomy and paternalism, they did differ on how the caregiving decisions were actually made. In the sibling-shared caregiving group, significantly more decisions were made autonomously by the parent than in the single caregiver group. Conversely, daughters in the single caregiver group made more paternalistic decisions for the parent than those in the sibling-shared caregiving group. It appears that siblings acting as a group to make caregiving decisions have more respect for an elderly parent's autonomy than does a single adult child deciding things independently. Somehow, when the siblings make decisions together, there seem to be checks and balances that insure that the parent's views are respected and represented.

Work in Progress. Currently in progress, with data analysis just getting underway, is a study of communication patterns of sibling dyads in middle age. Both members of a sibling dyad were interviewed in depth about the nature and extent of communication between them, as well as assessed on a variety of measures of their interpersonal relationship. Results should increase our understanding of how siblings interact in adulthood.

SUMMARY AND CONCLUSIONS

From a structural rather than a process approach, sibling constellation variables provide a framework around which to organize sibling relationships and interactions in adulthood and old age. These variables include the number of siblings in the family (alive and dead), their birth order or ordinal position, their age spacing, their gender, the ratio of female to male siblings, and their age level (whether they are young adults, middle aged, or elderly). Although some researchers hold that sibling research should consider process variables rather than sibling structure variables, others (Scarr & Gracek, 1982; Teti, 1992) hold that sibling constellation variables remain important in helping to understand certain phenomena.

The existing research makes clear that, for most people, sibling relationships remain important in middle and old age. Although siblings continue to maintain contact until very late life, it appears that the mere awareness of the existence of living siblings rather than the amount of contact is important for various aspects of well-being. In particular, having a sister has been related to higher morale, life satisfaction, social stimulation, and sense of security, and to less depressive symptomatology. Whether the different sex-role expectations pertaining to relationships with sisters as compared to those with brothers are responsible for the observed phenomena has not been established yet.

Sibling relationships do not remain constant, but change over the life span. In general, during infancy and childhood, siblings interact to form their basic relationship. Their developing relationship in childhood and adolescence may be characterized at any stage by its predominant aspect: closeness, rivalry, or indifference. During early adulthood, siblings begin to share their lives less as they become involved in careers, marriages, and other interests, and a certain distance or indifference may predominate. But during middle age and in old age, there is a tendency for siblings to become closer again. Dormant rivalries may resurface at this time during stressful family situations but, in general, closeness tends to predominate, with only a small percentage of siblings maintaining rivalry or indifference.

Siblings act as socializing agents throughout the life span, but in middle age, there is a shift toward acting as helping agents, with the sibling group providing needed help for their aging parents. There is some evidence that siblings may act in a concerted way to provide such help. There may be subsystems of siblings providing help in larger families; sister teams provide more help than do brothers. This trend for siblings to act as helping agents continues into old age, in which siblings provide psychological support, expressions of commitment for instrumental support if needed, and actual instrumental support for one another. Siblings are seen as a kind of backup system; they are considered a source of help in a crisis, but are not frequently used. Such support is related to the increased dependency of the elderly, accompanying declines in physical health and mental functioning, and the lack of availability of a spouse or adult children.

The adult attachment model is one possible way of explaining the persistence of sibling relationships in later life, as well as adult children's motives for helping one another and their concerted effort to help elderly parents. As yet, however, the evidence supporting such a model is quite limited.

Because there has been relatively little research into sibling relationships in this portion of the life span, there are many areas in which future research can proceed. There is an urgent need to study relationships between pairs who are not full siblings; virtually nothing is known of such relationships at the present time. Certainly there is a need to study the process of sibling interaction and how it is influenced by other family subsystems, as well as to study the effects of context. No existing studies have investigated process, and only a few have gathered reports from more than one sibling concerning their dyadic relationship. Finally, there is a need to determine whether findings are universal or culture-specific (Cicirelli, 1994; Weisner, 1989).

If present trends are an indication, sibling relationships may take on greater significance in the future as members of the baby boom generation reach old age. Not only do they have more siblings than members of the previous generation, but they may need to rely on sibling help to a greater extent because they have had less stable marriages, more divorces, and fewer children of their own. Conceivably, the sibling connection could become a central relationship in their lives. However, with the increased prevalence of step-, half-, adoptive, and fictive siblings, it is unclear just what the resulting sibling relationships will be in middle and old age. In that event, much research needs to be done to understand sibling relationships and help in middle and old age.

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SIBLINGS, BEHAVIORAL GENETICS, AND COMPETENCE*

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Any topic in developmental research would profit from the study of siblings. For example, research on siblings has provided a new look at family processes (Dunn & Kendrick, 1982) and at social development (Dunn, 1988). The purpose of this chapter is to propose another reason to study siblings: They provide an entrée into behavioral genetic issues. One does not need to be a behavioral geneticist in order to address behavioral genetic research questions about the origins of individual differences in development. The most important behavioral genetic research will increasingly be conducted by researchers who are not behavioral geneticists, but rather by experts from substantive domains who use behavioral genetic methods to address theory-driven questions. Studying siblings is a first step in this direction.

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Little can be lost and much can be gained by including siblings in developmental research. Including siblings does not prohibit asking any research questions of interest. In addition, data from a second child in each family can be employed for purposes of replicating research using a within-family comparison. The researcher can then step back and look at the topic from a new perspective that considers sibling similarities and differences.

The most obvious question concerns familial resemblance: How similar are siblings in the same family for a given phenomenon? Surprisingly, for many traits, siblings are dissimilar; this leads to the question of why siblings in the same family are so different. These are key issues in behavioral genetics. Other behavioral genetic questions are less obvious. Questions can be asked about developmental changes in sibling resemblance. Also, multivariate questions can be asked: Do familial or nonfamilial influences on one dimension or disorder overlap with such influences on another? Finally, sibling research can be used to address the critical issue of etiological links between the normal and abnormal. These five types of sibling analyses are examined in this chapter. We begin, however, with introductory discussions concerning behavioral genetics and individual differences.

Sibling analyses are familial rather than genetic. That is, resemblance between siblings can be due to genetic factors because siblings are first-degree relatives whose coefficient of genetic relatedness is .50. Sibling resemblance can also be due to shared environmental influence because siblings grow up in the same family. Studies of twins and adoptive siblings are needed to disentangle the relative contribution of nature and nurture to sibling resemblance. As a first step toward understanding the etiology of individual differences in development, studies of siblings are nonetheless valuable in documenting the importance of familial resemblance, regardless of its nature or nurture origins.

Although the focus of this chapter is on sibling analyses of familiality rather than twin and adoption analyses that disentangle nature and nurture, the logistics of disentangling genetic and environmental sources of familial resemblance are not as difficult as one might think. Approximately 1% of all births produce twins. Moreover, twins, and especially parents of young twins, are particularly willing to participate in research because twins are perceived to be special. Even adoption designs are still possible. During the 1960s and early 1970s, approximately 1% of all births involved nonfamilial adoptions, and about one-third of adoptive parents adopted a second child (Mech, 1973). Although the numbers of such adoptions declined dramatically during the 1970s due to contraception and abortion, an adoption study of young adults, born in the 1960s and early 1970s, is possible. Moreover, recent increases in the number of stepfamilies affords the opportunity to estimate genetic influence by comparing full, half, and unrelated siblings (Reiss, 1993).

In this chapter, we discuss the value of sibling research in addressing behavioral genetic issues. Perceived competence is used throughout the chapter as an example of an area of developmental research that has only recently begun to be investigated using sibling as well as twin and adoption designs. The benefits of including siblings in developmental research can also be seen in this volume in the chapter on delinquency and IQ by David Rowe (Chapter 7).

INDIVIDUAL DIFFERENCES AND PERCEIVED COMPETENCE

Behavioral genetic research focuses on the investigation of individual differences within a species, not species-typical development. The behavioral genetic question is, why do some children perceive themselves, and are perceived by others, as more competent than other children? In contrast, much theory and research describes normative developmental stages of perceived competence. Although it is important to consider species-wide themes as well as variations on these themes (McCall, 1981; Scarr, 1992, 1993), it is also important to emphasize the distinction between these two perspectives. The processes involved in the development of individual differences can differ from the processes responsible for species-typical development. For example, the young of mammalian species require caregivers and form special relationships with them, a universal feature of our species and other mammals, which is surely the genetic result of evolutionary processes. There are, however, individual differences in attachment relationships within our species. These individual differences may be influenced by genetic differences between infants or between caregivers, or they may be due entirely to nongenetic factors. In summary, behavioral genetic research addresses phenotypic differences among individuals in a population. Its goal is to ascribe phenotypic differences to genetic and environmental sources of variance. The theory and methods of behavioral genetics are presented elsewhere in overview (Plomin, 1990) and in detail (Plomin, DeFries, & McClearn, 1990).

Most behavioral genetic research continues to focus on cognitive abilities, personality, and psychopathology. Not coincidentally, these are the three domains of psychology in which individual differences have been most extensively studied (Plomin & McClearn, 1993). In contrast, little is known about the origins of individual differences in traditional areas of social development such as perceived competence. This lack of behavioral genetic research is due to the focus of social development research and theory on species-typical developmental themes rather than individual variations (Plomin, 1994). More specifically, theories of perceived competence tend to be normative theories, although some strands of empirical research in this domain have long considered individual differences (Harter, 1983).

There is a wide range of differences among children in how competent they perceive themselves, and are perceived by others, to be. Research is needed to describe, predict, and explain these individual differences. For example, why are some children so low in perceived competence? Moreover, as compared to normative questions, questions about individual differences are more amenable to research that goes beyond mere description toward prediction and explanation (for additional discussion of these issues, see Plomin, DeFries, & Fulker, 1988).

HOW SIMILAR ARE SIBLINGS IN PERCEIVED COMPETENCE? UNIVARIATE SIBLING ANALYSIS

A methodological issue that must be raised in relation to sibling correlations is that relatively large numbers of sibling pairs are required for adequate statistical power (Cohen, 1988). For example, with only 25 pairs of siblings, a sibling correlation would need to be .34 to be detected as statistically significant ($p < .05$, one-tailed because we are testing for positive sibling resemblance). A correlation of nearly .50 is required for 80%

power, that is, providing the ability to detect a true correlation of that magnitude four out of five times. More reasonable is a sample size of 50 pairs, with which a sibling correlation of .24 will be statistically significant and one of .35 will provide 80% power. Of course, from a statistical point of view, bigger sample sizes are definitely better.

In behavioral genetics, a special kind of correlation called an intraclass correlation is employed. The usual Pearson product–moment correlation is an interclass correlation in that it assumes that there are two distinct variables. This is not the case for the relationship between siblings for a single variable. The intraclass correlation takes into account all possible pairings of siblings within a family and is calculated using analysis of variance to compare variance between families (i.e., between sibling pairs) to total variance (i.e., variance within sibling pairs plus variance between sibling pairs). However, if in each family one sibling is randomly assigned to one arbitrary "class" and the other sibling to the other arbitrary "class," and then the usual interclass correlation is computed, this interclass correlation will be very similar to the intraclass correlation.

Substantial sibling resemblance can be expected because researchers have assumed that perceived competence largely depends on family environment (Wylie, 1979). An unstated implication of this emphasis on family environment is that siblings growing up in the same family should be similar in terms of perceived competence. Given the extent of genetic influence on personality, psychopathology, and cognitive abilities, it seems likely that genetic factors contribute to individual differences in perceived competence. Behavioral genetic research on this topic is especially timely given recent criticism that behavioral genetic researchers have not investigated domains such as perceived competence, which are thought to be due to nurture rather than nature (Hoffman, 1991).

By studying only one child per family, researchers have made the implicit assumption that environmental influences that contribute to perceived competence occur between families. Differences within families have been left unexplored. The use of siblings makes it possible to disentangle familial influences shared by siblings from those specific to each child (Reiss, 1993).

The first sibling studies of perceived competence have been reported for teacher, parent, and self ratings in adolescence (McGuire, Neiderhiser, Reiss, Hetherington, & Plomin, 1994; Neiderhiser, McGuire, Plomin, Hetherington, & Reiss, 1995) and for teacher and parent ratings in middle childhood (Neiderhiser & McGuire, 1994). These reports come from the Nonshared Environment in Adolescent Development (NEAD) project (Reiss, et al., 1994) and the Colorado Adoption Project (CAP; DeFries, Plomin, & Fulker, 1994; Plomin et al., 1988).

NEAD includes 720 families with same-sex sibling pairs no more than 4 years apart in age, ranging from 10 to 18 years. There were approximately equal numbers of male and female sibling pairs. Six types of siblings were studied in two types of families—never-divorced families and stepfamilies. The never-divorced families included 93 monozygotic twin pairs, 98 dizygotic twin pairs, and 93 full sibling pairs. Stepfamilies included 180 full sibling pairs, 108 half sibling pairs, and 130 unrelated sibling pairs. Never-divorced families with full siblings were obtained through random-digit dialing of 10,000 telephone numbers throughout the United States. Most twin families and stepfamilies were recruited through national market panels of 675,000 households. The families were primarily middle class (average family income was $25,000–$35,000) and of European ancestry (94% of mothers and 93% of the fathers were Caucasian).

CAP is a longitudinal adoption design begun in 1975 that includes 245 children adopted in the first few weeks of life, their adoptive and biological parents, and a matched control group of 245 nonadoptive parents and children. Younger siblings in these families were also included in order to provide a sibling adoption design that compares genetically related siblings (nonadoptive siblings) and genetically unrelated siblings (adoptive siblings). Biological parents were solicited through two Denver adoption agencies. The majority of biological mothers and approximately 20% of biological fathers were typically tested during the last trimester of the mother's pregnancy. Following the birth of the child, biological mothers who chose to relinquish the child for adoption had no further contact with the child after leaving the hospital. Adoptive parents were asked to participate after the adoption was finalized. Nonadoptive families were recruited through local hospitals. Nonadoptive parents who expressed interest in the project were selected on the basis of matching an adoptive family with the following criteria: gender of the target child, number of children in the family, age of father, occupational status of father, and total years of father's education. After a match between adoptive and nonadoptive families was made, nonadoptive couples were invited to participate in the same 3-hour testing program administered to the adoptive and biological parents. Nearly 90% of the biological parents and more than 95% of the adoptive and nonadoptive parents were Caucasian; the rest were primarily Hispanic and Asian. In general, the sample was found to be representative of the suburban Denver area. The adopted and nonadopted children, their siblings, and the home environment were assessed yearly from 1 year following the initial evaluation through middle childhood, with ongoing testing through adolescence.

Table 4.1 presents NEAD sibling correlations for perceived self-competence for adolescent full siblings in stepfamilies and in never-divorced families (McGuire et al., 1994). Full siblings are first-degree relatives whose coefficient of genetic relatedness is .50 as a result of sharing the same biological mother and father. Perceived competence and self-worth were assessed using Harter's (1988) Self-Perception Profile for Adolescents, omitting the scales of job competence and romantic appeal. Age and gender differences can inflate sibling correlations because siblings are close in age and some pairs are of the same gender. For perceived self-competence, gender and age effects were small. Nonetheless, in order to prevent any effect on sibling correlations, scores were corrected for age, gender, and gender-by-age interaction effects (McGue & Bouchard, 1984).

TABLE 4.1 UNIVARIATE SIBLING ANALYSIS: NEAD ADOLESCENT SIBLING INTRACLASS CORRELATIONS IN NEVER-DIVORCED FAMILIES AND IN STEPFAMILIES FOR HARTER'S (1988) SELF-PERCEPTION PROFILE FOR ADOLESCENTS

	Sibling Intraclass Correlations	
	Never-divorced Families (N = 94 pairs)	**Stepfamilies (N = 179 pairs)**
Scholastic	.29*	.15*
Athletic	.14	.06
Social	.07	.12
Physical Appearance	.08	.09
General Self-Worth	-.02	.09
Morality	.22*	.15*
Friendship	.12	.10

*$p < .05$.

Note. Adapted from "Genetic and Environmental Influences on Perceptions of Self-worth and Competence in Adolescence: A Study of Twins, Full Siblings, and Step Siblings," by S. McGuire, J. M. Neiderhiser, D. Reiss, E. M. Hetherington, & R. Plomin, 1994, *Child Development*. Copyright by Society for Research in Child Development. Reprinted by permission.

The sibling intraclass correlations in Table 4.1 indicate that siblings growing up in the same family are not very similar in their perceived self-competence. Although the scholastic and morality scales yield significant sibling correlations, the magnitudes of the correlations are quite low. The pattern of results is generally similar for siblings in never-divorced families and stepfamilies, although the magnitude of sibling correlations is somewhat lower in stepfamilies.

It should be mentioned that sibling correlations such as these directly index the extent to which variance covaries within sibling pairs, not the correlation squared. Correlations are squared in order to estimate the variance of one variable that can be predicted by another variable. Although one might wish to ask how much much of the variance of siblings' scores can be predicted by the co-siblings' scores, the issue at hand is the extent to which variance of siblings' scores covaries within pairs of siblings. The sibling correlation itself rather than the squared correlation addresses this issue.

Table 4.1 indicates that only about a quarter of the variance of the scholastic and morality scales covary for siblings. For the other scales, less than 10% of the variance covaries within pairs of siblings. Thus, these sibling data lead to the conclusion that siblings growing up in the same family are quite different in their perceived self-competence. Because the NEAD study included identical (MZ) and fraternal (DZ) twins, half-siblings, and unrelated siblings in addition to full siblings, it was possible to disentangle sibling resemblance due to shared heredity and shared family environment. The results of model-fitting analyses clearly indicated that the modest sibling resemblance observed in Table 4.1 is due to shared heredity, not to shared family environment (McGuire et al., 1994).

In CAP, Harter's (1982) Self-Perception Profile was administered to each sibling during a telephone interview when the child was 9 and again when he or she was 10 years of age. Sibling resemblance was determined by correlating the older sibling's assessment at 9 years old with that of the younger sibling at the age of 9; the same was done for the older and younger siblings' assessments at age 10. Comparisons of the children's self-perceptions at the same age controls for disparities that could arise from developmental differences between siblings of different ages. CAP sibling correlations at 9 and 10 are presented in Table 4.2 for a small sample of nonadoptive siblings. Similar to the NEAD results, sibling resemblance was greatest

TABLE 4.2 UNIVARIATE SIBLING ANALYSIS: CAP SIBLING INTRACLASS CORRELATIONS AT 9 YEARS AND 10 YEARS OF AGE FOR HARTER'S (1982) SELF-PERCEPTION PROFILE

	Sibling Intraclass Correlations	
	9 Years (N = 46 pairs)	10 Years (N = 33 pairs)
Scholastic	.41*	.22
Athletic	.06	.20
Social	−.13	.10
Physical Appearance	.39*	−.07
General Self-Worth	.29*	.08
Morality	−.01	.08

*$p < .05$.

Note. Adapted from "Competence During Middle Childhood," by J. M. Neiderhiser & S. McGuire, *Nature and Nurture During Middle Childhood*, edited by J. C. DeFries, R. Plomin, & D. W. Fulker, 1994, Cambridge, MA: Blackwell. Copyright by Blackwell. Reprinted with permission.

for perceptions of scholastic competence. Because CAP also includes adoptive siblings (pairs of genetically unrelated children adopted into the same family), it was possible to estimate the genetic contribution to the modest sibling resemblance. As in the NEAD project, model-fitting genetic analyses in CAP indicate that the familial resemblance is due solely to shared heredity rather than shared family environment (Neiderhiser & McGuire, 1994).

In contrast to the NEAD results, the morality scale in CAP showed no significant sibling resemblance at 9 or 10 years. Although this may be due to cohort effects, differences between samples (e.g., adoptive vs. stepfamilies), or small sample sizes, a more interesting possibility is that this finding represents an increase in familial influence from middle childhood (CAP) to adolescence (NEAD) for this dimension of perceived self-competence. Such developmental sibling comparisons are the topic of the following section. Another interesting developmental aspect of the CAP results is the decline in sibling resemblance from 9 to 10 years of age for the physical appearance scale and the general self-worth scale. Further research is needed to follow up on this possible developmental trend as children move from middle childhood to early adolescence.

Similar NEAD results were obtained using Harter's (1982) Teacher's Rating Scale of Actual Behavior (Neiderhiser et al.,

Table 4.3 Univariate Sibling Analysis: NEAD Sibling Intraclass Correlations in Never-divorced and in Stepfamilies for Harter's (1982) Teacher's Rating Scale of Actual Behavior

	Sibling Intraclass Correlations	
	Never-divorced Families (*N* = 46 pairs)	Stepfamilies (*N* = 74 pairs)
Cognitive Competence	.21	.35*
Social Competence	.06	.21

$^*p < .05$.
Note. Adapted from *Teacher Ratings of Cognitive and Social Competence of Adolescents: Genetic as well as Environmental Influences*, by J. M. Neiderhiser, S. McGuire, R. Plomin, E. M. Hetherington, & D. Reiss, 1995, manuscript submitted for publication. Reprinted with permission.

1995). Two teachers were nominated by each child during interviews in the home. Each teacher who was nominated was asked to complete the teacher questionnaire and to return it to us by mail. Sibling correlations for the cognitive and social competence scales, the two competence scales for which teachers indicate confidence in their ratings (Harter, 1982), are shown in Table 4.3. For full siblings in both never-divorced and stepfamilies, modest sibling resemblance was found for cognitive competence, and even less sibling resemblance was found for social competence. Similar to the results for self-ratings, genetic model-fitting analyses that included all of the NEAD sibling groups indicated that this modest sibling resemblance was due to shared heredity rather than shared environment (Neiderhiser et al., 1995).

Mother ratings of social competence were also obtained in CAP when the children were 7 years old, using a measure derived from the Walker–McConnell Scale of Social Competence (Walker & McConnell, 1988). Teacher ratings on a similar measure were obtained for the siblings, on average about 2 years apart, when each sibling was 7 years old and again when each sibling was 9 years old. Again, the older and younger siblings' age 7 assessments were correlated with each other to determine sibling resemblance, as were their age 9 assessments. Sibling correlations for these measures are listed in Table 4.4. Maternal ratings for popularity and confidence yielded significant sibling correlations, but not for leadership. Teacher ratings made when each sibling was 7 years old yielded significant sibling resemblance for all three dimensions, even though the two children were rated on average 2 years apart and usually by differ-

TABLE 4.4 UNIVARIATE SIBLING ANALYSIS: CAP SIBLING INTRACLASS CORRELATIONS FOR MOTHER RATINGS AT 7 YEARS AND TEACHER RATINGS AT 7 AND 9 YEARS ON SOCIAL COMPETENCE SCALES

	Sibling Intraclass Correlations	
	7 Years (N = 55 pairs)	9 Years (N = 38 pairs)
Maternal Ratings		
Popularity	.29*	—
Confidence	.41*	—
Leadership	.10	—
Teacher Ratings		
Popularity	.36*	.16
Confidence	.42*	.26
Leadership	.37*	.30*

*$p < .05$.

Note. Adapted from "Competence During Middle Childhood," by J. M. Neiderhiser & S. McGuire, *Nature and Nurture During Middle Childhood*, edited by J. C. DeFries, R. Plomin, & D. W. Fulker, 1994, Cambridge, MA: Blackwell. Copyright by Blackwell. Reprinted with permission.

ent teachers. From a developmental perspective, the decrease in sibling correlations from 7 to 9 years for teacher ratings of social competence, suggests the possibility of a diminished role for familial influences in early adolescence.

WHY ARE SIBLINGS SO DIFFERENT? NONSHARED SIBLING ANALYSIS

As in most other domains of development (Dunn & Plomin, 1990; Plomin, Chipuer, & Neiderhiser, 1994), siblings growing up in the same family are quite different in terms of perceived competence. Sources of sibling differences are called *nonshared* because they are not shared by children growing up in the same family, thus making siblings different rather than similar.

One direction for research in this area is to identify specific nonshared environmental factors by examining differential experiences of siblings. For example, are differential experiences of siblings related to differences in their perceived self-competence? Rather than investigating socialization correlates on a family-by-family basis—which is typically done (Wylie, 1979)—

sibling *differences* in perceived self-competence can be related to differential experiences of siblings. The point of such nonshared environmental analyses is to find those influences that are specific to each child within a family, because such nonshared influences are most important for the development of individual differences for all children, not just for siblings. Identifying specific sources of nonshared environment is the goal of the NEAD project (Reiss et al., 1994). Some success has been achieved for antisocial behavior and depression (Reiss et al., in press). However, no attempt has previously been made to identify environmental correlates of sibling differences in perceived self-competence.

This question can be addressed in several ways. In NEAD, initial work has focused on two major models. One model uses a regression approach that identifies aspects of one sibling's experiences that are related to that sibling's outcomes independent of the other sibling's experiences (Reiss et al., in press). The second model is a simple differences model in which differences in sibling experiences are related to differences in sibling outcomes (Pike, Hetherington, Reiss, & Plomin, 1995). As an example of the differences model, we examined associations between sibling differences in perceived self-competence and sibling differences in major composites of parenting. Using NEAD data from full siblings in never-divorced families and stepfamilies, relative sibling differences were calculated by subtracting the younger sibling's score from the older sibling's score on each of the perceived self-competence scales and on three major composites of parenting (positive, negative, control). The parenting composites were derived from factor analyses of various questionnaire measures that yielded similar factor structures for child reports and parent reports (Plomin, Reiss, Hetherington, & Howe, 1994).

Table 4.5 presents correlations between differential experiences as assessed by child and parent reports on the three composite measures of parenting and sibling differences for a single Harter scale of perceived self-competence: general self-worth. Siblings' differences in their perceptions of their parents' positive and negative aspects of parenting are related to differences in their perceptions of general self-worth. Within sibling pairs, the sibling with higher perceived worth also perceived more positive and less negative parenting. Sibling differences in perceived self-worth were not related to perceptions of parental differences in control. Results were similar for never-

TABLE 4.5 NONSHARED SIBLING ANALYSIS: CORRELATIONS BETWEEN RELATIVE SIBLING DIFFERENCES IN PERCEIVED SELF-COMPETENCE (GENERAL SELF-WORTH) AND PARENTING IN NEAD

	Correlations with Siblings' Relative Differences in Perceived General Self-Worth	
Relative Sibling Differences for Parenting	**Never-divorced Families (N = 93 pairs)**	**Stepfamilies (N = 181 pairs)**
Child Ratings of Mother		
Positive	.26*	.25*
Negative	-.20	-.20*
Control	-.01	.00
Child Ratings of Father		
Positive	.15	.26*
Negative	-.17	-.22*
Control	-.01	.11
Mother Ratings		
Positive	.03	.08
Negative	-.14	-.15
Control	-.10	.11
Father Ratings		
Positive	.04	.10
Negative	-.13	-.03
Control	-.07	.08

*$p < .05$.
Note. Unpublished data.

divorced families and stepfamilies. A rater effect appears to operate in that correlations were lower when differences in sibling perceptions of self-worth were correlated with differences in parental perceptions of parenting rather than siblings' own perceptions of parenting, as shown in the second half of Table 4.5. Results for the other Harter scales were generally similar.

Siblings can also be used to identify nonshared behavioral correlates, such as temperamental differences, that might be related to differences in perceived self-competence. Again, NEAD data from full siblings in never-divorced families and stepfamilies were used as an example. Table 4.6 presents correlations between sibling differences in parental ratings of temperament and sibling differences in the general self-worth scale of Harter's perceived self-competence measure in NEAD. Child temperament was assessed using the EAS Temperament Survey-Parent Form (Buss & Plomin, 1984), a 20-item questionnaire that assesses four dimensions of temperament: emotionality, activity level, sociability, and shyness.

TABLE 4.6 NONSHARED SIBLING ANALYSIS: CORRELATIONS BETWEEN RELATIVE SIBLING DIFFERENCES IN PERCEIVED SELF-COMPETENCE (GENERAL SELF-WORTH) AND PARENTAL RATINGS OF TEMPERAMENT IN NEAD

Relative Sibling Differences for Temperament	Correlations with Siblings' Relative Differences in Perceived General Self-Worth	
	Never-divorced Families (N = 93 pairs)	Stepfamilies (N = 181 pairs)
Mother Ratings		
Emotionality	-.25*	-.04
Activity	.22*	.15*
Sociability	.02	.23*
Shyness	-.09	-.21*
Father Ratings		
Emotionality	-.26*	-.08
Activity	.34*	.15*
Sociability	.31*	.14
Shyness	-.19	-.21*

*$p < .05$.
Note. Unpublished data.

Sibling differences in perceived general self-worth are related to sibling differences in temperament as rated by parents. As expected, the sibling with higher perceived self-worth is rated more positively by both mothers and fathers—that is, as less emotional, more active, more sociable, and less shy. It is interesting but puzzling that for both mother and father ratings of the siblings' emotionality, the correlations with perceived self-worth are lower in stepfamilies than in never-divorced families. Otherwise, results are generally similar for the two types of families; results are also similar for the other Harter scales.

DOES SIBLING RESEMBLANCE IN COMPETENCE CHANGE DURING PUBERTY? DEVELOPMENTAL SIBLING ANALYSIS

Although the earliest twin studies focused on age differences in twin resemblance (Merriman, 1924; Thorndike, 1905), interest in developmental issues virtually disappeared until the past decade (Plomin, 1986). Developmental sibling analyses include two major categories: cross-sectional or longitudinal comparisons of familial influence as a function of age, and longitudinal analysis of continuity and change from age to age.

Sibling correlations can be examined as a function of age in order to explore developmental differences in familial influence. Several examples of possible developmental change in familial influence on competence were noted earlier. For instance, comparisons between the CAP data in middle childhood and the NEAD data in adolescence suggested increases in familial resemblance from childhood to adolescence for the morality scale of the perceived self-competence measure. In addition, the CAP data, which permit longitudinal comparisons for the same sample, suggest a decrease in familial resemblance from 9 to 10 years for perceived self-competence on the physical appearance scale and the general self-worth scale. A third example of possible developmental change in familiality emerged from the analyses of teacher ratings at 7 and 9 years in CAP. Although the sibling sample sizes are small and the findings need to be replicated, the results suggest a decline in familial influence from 7 to 9 years for teacher ratings of competence. This might be another example of siblings "growing up and growing apart" (McCartney, Harris, & Bernieri, 1990).

A more general use of this type of developmental sibling analysis is to compare sibling resemblance cross-sectionally as a function of age within a single study. One approach is to treat age as a continuous measure and to ask whether sibling resemblance interacts with age using a hierarchical multiple regression approach described elsewhere (Ho, Foch, & Plomin, 1980). When age is continuously distributed within a study, it is seldom appropriate to divide the sample at some median age and to compare sibling correlations for younger and older siblings. However, such group comparisons are appropriate when the sample is divided in terms of a discontinuous marker such as before and after the transition to school or pre- and postpuberty. For example, the NEAD sample is nearly equally divided into children who are prepubertal, midpubertal, and postpubertal. Using mothers' reports of children's pubertal status, we selected sibling pairs in which both siblings were prepubertal or just beginning puberty and those sibling pairs in which both siblings were in advanced puberty or postpubertal, combining never-divorced families and stepfamilies in order to increase the sample size. This resulted in 34 prepubertal pairs and 90 postpubertal pairs.

Using this biological index of development, we can ask whether sibling resemblance differs for pairs in which both siblings are

TABLE 4.7 DEVELOPMENTAL SIBLING ANALYSIS: NEAD ADOLESCENT SIBLING INTRACLASS CORRELATIONS FOR PREPUBERTAL AND POSTPUBERTAL PAIRS USING HARTER'S (1988) SELF-PERCEPTION PROFILE FOR ADOLESCENTS

	Sibling Intraclass Correlations	
	Prepubertal Siblings (N = 34 pairs)	Postpubertal Siblings (N = 90 pairs)
Scholastic	.24*	.19*
Athletic	.15	−.02
Social	.29*	.07
Physical Appearance	.32*	−.03
General Self-Worth	.30*	−.04
Morality	.11	.20*
Friendship	.25*	.13

*$p < .05$.
Note. Unpublished data. Full siblings in never-divorced and stepfamilies have been pooled for this analysis.

prepubertal and those in which both siblings are postpubertal. Table 4.7 presents sibling correlations for perceived self-competence in NEAD for prepubertal and postpubertal sibling pairs. The developmental comparisons presented earlier suggest that if sibling resemblance changes during development it declines. The results, for the most part, support this hypothesis. Except for morality, the results for all subscales suggest that sibling resemblance declines from prepubertal to postpubertal status, although none of the correlations are significantly different; this leaves open the possibility that these differences are due to chance variation. Nonetheless, as they stand, these results suggest the hypothesis that familial influences on perceived self-competence, especially for physical appearance and general self-worth, may decline in impact from prepuberty to postpuberty.

A second type of developmental sibling analysis addresses familial contributions to age-to-age continuity and change. This sibling analysis requires longitudinal data. The analysis rests on cross-sibling correlations in which one sibling's score at one age is correlated with the other sibling's score at the other age. The upper limit for such cross-sibling correlations is the longitudinal correlation for individuals. Cross-sibling correlations assess the extent to which familial factors are responsible for the longitudinal correlations.

Table 4.8 presents CAP longitudinal cross-sibling correlations from 9 to 10 years for self-ratings of competence and from 7 to

Table 4.8 Developmental Sibling Analysis: CAP Longitudinal Cross-Sibling Correlations from 9 to 10 Years for Self-Ratings and from 7 to 9 Years for Teacher Ratings of Competence

Measure	**Longitudinal Stability Correlation (*N* = 130 pairs)**	**Longitudinal Cross-Sibling Correlation (*N* = 33 pairs)**
Perceived Self-Competence		
Scholastic	.40*	.33*
Athletic	.31*	.11
Social	.37*	.08
Physical Appearance	.47*	.13
General Self-Worth	.29*	.05
Morality	.37*	.05
Teacher Ratings		
Popularity	.37*	.35*
Confidence	.38*	.16
Leadership	.45*	.37*

$^{*}p < .05$.
Note: Unpublished data.

9 years for teacher ratings, combining adoptive and nonadoptive siblings. Two cross-sibling correlations could be presented: one for the younger sibling at age 7 versus the older sibling at age 9, and the other for the younger sibling at 9 versus the older sibling at 7. However, a technique often used in behavioral genetics is called *double entry*, which means entering the siblings twice with their order reversed. That is, if the array of younger siblings is A and the array of older siblings is B, instead of simply correlating A with B, we enter A followed by B, and we enter B followed by A. When the A–B array is correlated with the B–A array, this double-entry procedure approximates an intraclass correlation of all possible pairings of A and B, as discussed earlier.

Table 4.8 presents cross-sibling intraclass correlations using this double-entry procedure. Longitudinal correlations for all individuals are also included in Table 4.8 for purposes of comparison because, as mentioned earlier, longitudinal correlations create an upper limit for cross-sibling longitudinal correlations. For self-ratings of scholastic competence and for teacher ratings of popularity and leadership, the cross-sibling correlations are significant, and they are nearly as great as the longitudinal correlations. This suggests that most of the stability from age to age for these dimensions can be accounted for by familial factors. Longitudinal genetic model-fitting analyses of these data, which compare adoptive and nonadoptive siblings, indicate that genetic factors are largely responsible for this familially mediated continuity (Neiderhiser & McGuire, 1994). Cross-sibling correlations that are much lower than the comparable longitudinal correlations, as is the case for the other competence dimensions, suggest that familial factors do not play a major role in continuity. Longitudinal genetic model-fitting analyses indicate that nonshared environmental factors (which include chance idiosyncratic experiences) play an important role in the continuity of these dimensions of self-competence (Neiderhiser & McGuire, 1994).

This analysis focuses on continuity, the extent to which familial factors are responsible for longitudinal stability. What about change? Adolescence is a peak period for change in self-competence (Damon & Hart, 1982; O'Malley & Bachman, 1983), as indicated by the modest longitudinal correlations from age to age shown in Table 4.8. A simple sibling analysis of developmental change employs age-to-age change scores. Sibling correlations can be calculated for these change scores to ask whether siblings change in similar directions and to a similar extent from age to age.

As an example, we calculated relative change scores for CAP children from 9 to 10 for their perceived self-competence and from 7 to 9 for teacher ratings of their competence. Because we created change scores by subtracting Age 1 scores from Age 2 scores, these are relative change scores. Some change scores were positive, indicating that competence increases from Age 1 to Age 2; and some differences scores were negative, indicating declines in competence. Table 4.9 lists intraclass correlations for these change scores. Changes in the siblings' perceptions of general self-worth and teacher ratings of confidence suggest some familial influence, although these correlations are not significant given the small sample size. For the other scales, the low and even negative correlations suggest that familial factors are not importantly involved in change in competence from age to age. That is, whatever causes children to change in their perceived self-competence or in teacher ratings of their competence, these agents of change are not shared by children growing up in the same family.

Although these preliminary developmental sibling analyses of self-competence raise many more questions than answers, they provide a glimpse of the exciting possibilities for charting the developmental course of familial influence using sibling data.

TABLE 4.9 DEVELOPMENTAL SIBLING ANALYSIS: CAP SIBLING CORRELATIONS FOR CHANGE SCORES FROM 9 TO 10 YEARS FOR SELF-RATINGS AND FROM 7 TO 9 YEARS FOR TEACHER RATINGS OF COMPETENCE

Measure	Sibling Intraclass Correlation for Change Scores (N = 33 pairs)
Perceived Self-Competence	
Scholastic	-.15
Athletic	.08
Social	-.23
Physical Appearance	.12
General Self-Worth	.23
Morality	.02
Teacher Ratings	
Popularity	-.19
Confidence	.25
Leadership	-.05

*$p < .05$.
Note. Unpublished data.

DO FAMILIAL EFFECTS ON COMPETENCE OVERLAP WITH OTHER MEASURES? MULTIVARIATE SIBLING ANALYSIS

In contrast to univariate sibling analyses that assess the familial contribution to the variance of a single variable, multivariate sibling analyses address the covariance between variables. For example, multivariate sibling analyses can be used to explore the antecedents and consequences of familial influence on perceived self-competence. Questions concerning antecedents include the extent to which sibling similarity in competence is due to sibling similarity in cognitive ability or personality. Multivariate sibling analyses can also address familial overlap in consequences or outcomes. For example, to what extent do sibling similarities and differences in perceived self-competence overlap with sibling similarities and differences in depression?

NEAD provides several examples of multivariate sibling analyses. One example involves correlates of cognitive competence. As shown in Table 4.3, teacher ratings of cognitive competence yield modest sibling correlations. To what extent is this due to familial resemblance in cognitive ability? Although IQ is not assessed in NEAD, vocabulary is included in the study. Vocabulary loads highly on a factor of general cognitive ability and is therefore appropriate for the present purpose.

Teacher reports of cognitive competence correlate .25 with tested vocabulary in NEAD. To what extent is this phenotypic correlation mediated by familial factors that overlap in their effect on cognitive competence and vocabulary? Cross-sibling correlations, described in the previous section, can be used to address this multivariate question. In a double-entry format, teacher ratings of cognitive competence for one sibling can be correlated with the vocabulary score of the other sibling. The cross-sibling correlations for full siblings in NEAD are .36 for the 48 sibling pairs in never-divorced families and .23 for the 78 sibling pairs in stepfamilies. Both cross-sibling correlations are significant and similar in magnitude to the phenotypic correlation of .25 between teacher ratings of cognitive competence and vocabulary. This finding suggests that the phenotypic correlation between cognitive competence and vocabulary is mediated entirely by familial factors. That is, the familial factors that contribute to teacher ratings of cognitive competence overlap completely with familial factors that affect vocabulary. A multivariate genetic analysis that included all six sibling groups in NEAD indicated that genetic factors are responsible for familial influences that overlap in their effect on cognitive competence and vocabulary (Neiderhiser et al., 1995). Other NEAD multivariate genetic analyses also point to genetic overlap between self-perceived scholastic competence and vocabulary and between self-perceived social competence and sociability (McGuire et al., 1994).

The reason why this multivariate sibling analysis focused on the familial contribution to covariation between competence and cognitive ability is that these two measures are correlated phenotypically. In many cases, however, domains of interest are not correlated. For example, teacher ratings of social competence correlate only .14 with adolescents' self-ratings of sociability (Neiderhiser et al., 1995). The familial contribution to this covariance is too small to detect with reasonable sample sizes because the phenotypic covariance itself is so small. A more appropriate question is the extent to which sibling differences in competence are due to sibling differences in temperament. For example, using the full siblings from the NEAD data set, we created relative sibling difference scores for teacher reports of social competence and for adolescents' self-reports of sociability. The correlation between these two difference scores was only

.10 in never-divorced families (*N* = 46 pairs) and .17 in stepfamilies (*N* = 76 pairs). This finding suggests that sibling differences in social competence are not much related to sibling differences in sociability.

A final example of the usefulness of multivariate sibling analyses involves cross-rater overlap. Teacher, parent, and self-reports of competence correlate modestly. To what extent do these various sources of information involve the same underlying familial factors? For example, do the familial effects on teacher ratings of competence overlap with familial effects on parent ratings and self-ratings? For the entire NEAD sample, teacher reports of cognitive competence correlate .37 with mother reports, .33 with father reports, and .39 with self-reports. Table 4.10 presents cross-sibling correlations between teacher reports and parent and self-reports. The cross-sibling correlations are on average about half the magnitude of the phenotypic correlations. This suggests that familial factors in part overlap in their effect on teacher ratings as compared to parent and self-ratings. In part, however, familial influences are unique to teacher ratings. In other words, they are independent of parent and self-ratings. This implies that teachers see aspects of competence that are etiologically different from competence as perceived by parents and by adolescents themselves. Multivariate genetic analyses of these data using all six of the NEAD sibling types indicate that most of the familial overlap among competence ratings by teachers, parents, and

TABLE 4.10 MULTIVARIATE SIBLING ANALYSIS: NEAD PHENOTYPIC CORRELATIONS AND CROSS-SIBLING CORRELATIONS COMPARING TEACHER RATINGS OF COGNITIVE COMPETENCE TO PARENT RATINGS AND SELF-RATINGS

	Correlations with Teacher Ratings of Cognitive Competence		
	Phenotypic	Cross-Sibling Correlation	
Measure of Cognitive Competence	Correlation (*N* = 664)	Never divorced (*N* = 48)	Step (*N* = 78)
Mother Report	.37*	.00	.10
Father Report	.33*	.16	.12
Self-Report	.39*	.29*	.13

*$p < .05$.

Note. Adapted from *Teacher Ratings of Cognitive and Social Competence of Adolescents: Genetic as well as Environmental Influences*, by J. M. Neiderhiser, S. McGuire, R. Plomin, E. M. Hetherington, & D. Reiss, 1995, manuscript submitted for publication. Reprinted with permission.

adolescents is genetically mediated. Despite this, substantial genetic influence on teacher ratings of competence are unique to teacher ratings; that is, some of these genetic effects are not shared in common with competence ratings by parents or adolescents (Neiderhiser et al., 1995).

In summary, multivariate sibling analyses have many potential applications for the exploration of links between measures, which is at the heart of such fundamental issues as heterogeneity and comorbidity in developmental psychopathology (Plomin & Rende, 1991). The benefit of multivariate sibling analyses is that they take into consideration these issues not only at the phenotypic level of analysis, but also at the etiological level of familial influence.

LINKS BETWEEN THE NORMAL AND ABNORMAL—DF SIBLING ANALYSIS

Finally, sibling research can be employed to address one of the most important questions in developmental psychopathology: the etiological links between the normal and abnormal. The word *etiological* is important here. The issue is not whether the phenotypic distribution of behavioral variation is continuous. Rather, the question is the extent to which developmental influences on behavioral problems of childhood are merely the extremes of influences in the normal range. That is, is psychopathology nothing more than the quantitative extreme of a continuous distribution of genetic and environmental influences? Or are genetic and environmental influences on abnormal behaviors qualitatively distinct from those that affect the normal range of variation? Sibling research can explore the extent to which familial factors for abnormal behavior are merely quantitatively extreme versions of familial factors responsible for the normal range of behavioral variation.

For example, are the familial factors involved in the normal range of variation in competence the same familial factors responsible for extremely low competence? If the answer is "no," it would imply that extremely low competence is etiologically different from variation in competence in the normal range. If the answer is "yes," it would imply that extremely low competence is nothing but the low end of the etiological factors responsible for the normal distribution of competence. In other words, if the latter were the case, it suggests that children low in competence are only quantitatively, not qualitatively, different from children higher in competence.

A new behavioral genetic analysis makes it possible to broach this fundamental issue of the etiological association between the normal and abnormal (DeFries & Fulker, 1985, 1988). This method has been called DF analysis after its developers, DeFries and Fulker (Plomin & Rende, 1991). DF analysis leads to an estimate of what is called group familiality, in contrast to the usual familiality, estimated, for example, by a sibling correlation, which could be called individual familiality. Individual familiality refers to the contribution of familial factors to the origins of individual differences for a trait. In contrast, group familiality refers to the familial contribution to the average difference on a quantitative measure between a selected group, such as an extreme group, and the rest of the population. DF analysis assesses group familiality as the regression toward the population mean of the siblings of probands (i.e., selected index cases) for a quantitative measure.

For example, teacher ratings of cognitive competence show individual familiality, as indicated in Tables 4.3 and 4.4. To what extent is low cognitive competence also influenced by familial factors? This question addresses the etiology of the average difference between children low in teacher-rated cognitive competence and the rest of the population. It does not ask about familial contributions to individual differences among children low in competence. That is, the question as to why one child low in teacher-rated competence has a slightly lower score than another low-competence child is relatively unimportant compared to the question as to why, as a group, children rated low in competence differ from the rest of the population. The causes of individual differences could well differ from the causes of average differences between groups. For example, for IQ, severe retardation shows no group familiality, whereas mild retardation shows substantial group familiality (Plomin, 1991). In terms of the low end of the dimension of competence, family factors may play a more (or less) important role than they do for individual differences for the entire distribution of competence.

If we select children who are low in teacher-rated competence, we would expect the competence scores of their siblings to regress somewhat toward the population mean. However, to the extent that familial factors are important in the etiology of the average difference between the low-competence group and the population, the competence scores of the siblings of the low-competence probands will not regress as far to the population mean. For example, the IQ scores of siblings of severely retarded individuals are similar to the population average of 100, whereas the IQ scores of siblings of mildly retarded individuals are much lower than the population average (Plomin, 1991). This suggests that group familiality occurs for mild retardation but not for severe retardation.

As an example of DF sibling analysis for competence, we selected children in the NEAD sample from the bottom 10% of teacher ratings of cognitive competence after pooling the full siblings in never-divorced and stepfamilies in order to increase the sample size. The typical approach in genetic research on disorders is to calculate concordance. That is, what percentage of the siblings of selected probands also meet the selection criterion? In the NEAD sample, 25 children (10%) met the criterion. Of these probands, six were in three concordant sibling pairs. The probandwise method for calculating concordance divides the number of affected siblings in concordant pairs (i.e., 6) by the number of probands (25). Thus, the probandwise concordance for low competence is .24. Probandwise concordance can be interpreted as a risk estimate: There is a 24% risk that the sibling of a proband identified as low in teacher-rated competence will also be rated low in competence.

The problem with concordance is that it treats quantitative information about competence as if it were qualitative. For this reason, DF analysis is superior in the analysis of dimensional (as opposed to diagnostic) data. In those cases where both members of a sibling pair met the criteria for the low-competence group, the data were double-entered so that each sibling served as a proband and a sibling. For the teacher-rated cognitive competence measure, the mean of the entire NEAD full sibling sample is 19.0. The probands, the lowest 10% of the distribution, had a mean competence score of 9.6. The siblings of the probands had a mean competence score of 16.3. Thus, the siblings of the low-competence probands had lower-than-average competence scores, indicating group familiality for low teacher-rated cognitive competence. An index of group familiality can be calculated from the mean scores for probands, siblings, and the population (Plomin, 1991). If scores are standardized, group familiality is merely the average of the sibling standardized scores divided by the mean proband score. The group familiality estimate for the low-competence sample in NEAD is .26.

Thus, DF sibling analysis indicates that familial factors contribute to the etiology of low competence. An additional step in DF analysis is to compare group familiality to individual familiality in order to explore the etiological links between the normal and abnormal. If group familiality differs from individual familiality, low competence is different etiologically from the normal range of competence. On the other hand, if group familiality is similar to individual familiality, this suggests that low competence may be nothing more than the etiological extreme of the normal distribution of familial effects. As just mentioned, the estimate of group familiality for teacher-rated low cognitive competence is .26. For the same measure, individual familiality was estimated to be .28 on average, as indicated by the sibling correlations in Table 4.3. Thus, the group familiality and individual familiality estimates are similar. This suggests that familial factors responsible for low cognitive competence as rated by teachers are quantitatively, not qualitatively, different from those responsible for normal variability in this measure of competence. Results for other samples could of course differ. In particular, it should be noted that the NEAD sample is a nonclinical sample. These DF results for NEAD children in the lowest 10% of the distribution of competence scores might differ from those obtained from a sample, for example, of clinically depressed children.

In summary, when sibling data are obtained using quantitative measures in an unselected sample, they provide an opportunity to examine sibling resemblance, not just as a correlation for the entire sample, but also as a "group" correlation for an extreme group. Research using this new technique will greatly advance understanding of the etiological relationship between the normal and abnormal.

CONCLUSION

The message of this chapter is that the inclusion of siblings in research makes it possible to address important and novel behavioral genetic questions concerning the etiology of individual differences. We examined five types of sibling analyses. Univariate sibling analyses estimate the importance of shared familial influences in development by assessing sibling resemblance. Univariate sibling analyses often indicate that siblings growing up in the same family are surprisngly different from one another. This leads to the second type of sibling analysis, nonshared sibling analysis, which asks why siblings are so different. Nonshared sibling analysis relates sibling differences on a target trait to sibling differences in experiences such as parental interactions or to sibling differences in other traits such as temperament.

The third set of sibling analyses is developmental in nature. Developmental sibling analyses include comparisons of sibling correlations as a function of age in order to investigate the extent to which the contribution of familial factors changes during development. Another type of developmental sibling analysis requires longitudinal data and assesses familial contributions to age-to-age continuity and change.

The fourth type of sibling analyses is multivariate. Multivariate sibling analyses investigate the extent to which familial factors that influence a target trait overlap in their effects on other traits. Such analyses have broad applications, for example, in analyzing heterogeneity and comorbidity in terms of familial etiology rather than symptomatology.

The fifth analysis, called DF sibling analysis, examines the familial links between the normal and abnormal. This analysis addresses the familial etiology of the average difference between a selected group, such as children with extreme scores or children who meet a diagnostic cut-off, and the rest of the population.

We provided examples of these sibling analyses in the domain of perceived competence, a domain that has only recently been examined using behavioral genetic strategies. Univariate sibling analyses consistently indicate significant shared familial influence for the scholastic dimension of perceived self-competence and teacher ratings of cognitive competence. Other dimensions of competence show less consistent patterns of familial influence.

As an example of nonshared sibling analyses, we examined associations between sibling differences in perceived self-competence and sibling differences in parenting. Within sibling pairs, siblings reporting higher perceived self-worth felt that their parents treated them more positively and less negatively than the parents treated their siblings. We also investigated associations between sibling diferences in perceived self-competence and sibling differences in parent-rated temperament.

Siblings with higher perceived self-worth were rated by their parents as less emotional, more active, more sociable, and less shy than were their siblings.

Several interesting results emerged from our developmental sibling analyses of perceived competence. In general, it appears that familial influence on competence declines in importance from middle childhood to adolescence, with the possible exception of the morality dimension of perceived self-competence. We presented new data on sibling resemblance for perceived self-competence as a function of pubertal status. It appears that sibling resemblance declines from pre- to postpuberty. In addition to investigating developmental changes in the magnitude of familial resemblance as assessed by sibling correlations, we used longitudinal cross-sibling correlations to explore familial contributions to age-to-age continuity. For self-reports of scholastic competence and for teacher ratings of popularity and leadership, familial factors appear to be responsible for most of the stability from age to age. For other dimensions of perceived self-competence, familial factors are not importantly involved in continuity. We also analyzed familial contributions to developmental change and found that familial factors, as assessed by sibling correlations for change scores, are not importantly involved in change in perceived self-competence or in teacher ratings of competence.

Three examples of multivariate sibling analyses were presented. We found that familial influences on teacher ratings of cognitive competence overlap completely with familial influences on vocabulary. That is, the same familial factors contribute both to cognitive competence and to vocabulary. We also analyzed sibling differences in teacher reports of social competence and adolescents' self-reports of sociability. The results indicated that sibling differences in social competence are not due to sibling differences in sociability. The third example of multivariate sibling analyses involved etiological overlap between teacher ratings of cognitive competence and parent and adolescent self-ratings. It appears that familial factors that affect teacher ratings of cognitive competence to some extent overlap with familial effects on parent and self-ratings. In part, however, teacher ratings assess aspects of cognitive competence that are etiologically different from competence as perceived by parents and by adolescents themselves.

Finally, as an example of DF sibling analysis, we investigated the extent to which low cognitive competence as rated by teachers is influenced by familial factors, as is the normal range of variation in teacher-rated cognitive competence. The results of DF sibling analysis suggested that familial factors responsible for low cognitive competence as rated by teachers are quantitatively, not qualitatively, different from those responsible for normal variability.

Numerous permutations of these sibling analyses are possible, and alternative analyses can be contemplated. Moreover, more elegant approaches to these analyses are available, such as model fitting. However, the goal of the chapter was not to provide an exhaustive description of sibling analyses relevant to issues of behavioral genetics. Rather, our aim was to present a few simple and practical examples of such analyses in order to highlight the importance of incorporating siblings in future research.

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5

ADULT SIBLING RELATIONSHIPS: RACIAL AND ETHNIC COMPARISONS

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Scholars have argued that siblings are ideally situated to provide social support: Relationships are lifelong, normatively supported, and based on equality of status (Avioli, 1989; Bedford, 1989; Rossi & Rossi, 1990). We have relatively little evidence, however, about the actual level of social support provided by siblings, nor do we know whether this form of extended-family support is more or less available in minority families.

This chapter examines racial and ethnic differences in sibling relationships for what they can tell us about the strength of the laterally extended family as a social support network. We review theory and research on the extended family among majority and minority populations, and then use a large national data set to compare one aspect of the extended family—adult sibling relationships—among African, Hispanic, Asian, and non-Hispanic White Americans. Sibling relationships will be assessed on four dimensions: coresidence, contact, actual exchange, and perceived supportiveness.

BACKGROUND

In 1943, Parsons provided a model of American kinship in which an inner circle of parents, children, and spouse is contrasted with an outer circle of relatives to whom one has fewer obligations. Parsons (1943) suggested that siblings are part of our inner circle when we are children, but move to the outer circle as we marry and have our own children. Parsons noted that his model was based largely on observations of the American White middle class (during a period, moreover, in which nearly everyone did marry and have their own children), and the generality of the model has yet to be established across socioeconomic and race/ethnic categories. Some observers have argued that the extended family is stronger (and, by implication, the line between inner and outer circle weaker) among African Americans (Stack, 1974). Rossi and Rossi's (1990) study of Bostonions, however, suggests that the pattern of normative obligations is more accurately described as different than stronger: Their African-American respondents reported *greater* distinction between inner circle and siblings, but *less* distinction between siblings and other nonnuclear kin. Very little research has examined Hispanic or Asian-American family structures. The material that follows reviews research findings on sibling relationships by race/ethnicity in the United States.

Race/Ethnicity and Sibling Solidarity

Coresidence. The research literature provides firm demonstration that one type of sibling solidarity—coresidence—is greater for African Americans than non-Hispanic Whites (Angel & Tienda, 1982; Beck & Beck, 1989; Tienda & Angel, 1982). Beck and Beck (1984, 1989) used data from the National Longitudinal Surveys (NLS) to examine the likelihood of *ever* having coresiding kin over a decade-long period. They concluded that middle-aged African Americans were twice as likely as non-Hispanic Whites to have ever had coresiding relatives. When focusing on "other relatives," a category that included siblings, African Americans reported three times greater likelihood of ever having coresident kin (31% vs. 11%). These differences are attributable in part to differences in marital status: For both racial groups, rates of coresidence were highest for those who were continuously or intermittently unmarried.

That coresidence is a type of social support and is the link among race, marital status, and coresidence is confirmed in other studies. Hofferth (1984) demonstrated that the only indicator of extendedness in which Black parents exceeded Whites significantly was coresidence—and this difference was largely attributable to greater frequency of single-parent families in the Black subsample. Meanwhile, Hofferth reported no racial difference in giving or receiving financial support. Hogan, Hao, and Parish (1990) generally replicated these findings using data on young mothers from the NLS. Once the greater likelihood of young mothers' coresiding with kin was controlled, Black mothers received *less* support than White mothers.

Research including Hispanics as well as Blacks and non-Hispanic Whites confirms the importance of marital status in predicting interaction with extended kin. Chavez (1985) confirmed a greater tendency of U.S. Hispanics to extend laterally, but noted that this tendency is most common among new immigrants and especially among illegal aliens. Tienda and Angel (1982), using data from the 1976 Survey of Income and Education, found that households of Hispanics from Central and South America are most likely to include laterally extended adults, African-American households are next, followed by those of Mexican Americans, and, finally, Puerto Ricans.

We have even less research on extended family relationships among the small and diverse Asian-American population. Focusing on coresidence, Kanjanapan (1989) reported enormous diversity across Asian ethnic groups along with a "consistent and powerful [positive] relationship" (p. 52) between length of stay in this country and likelihood that unmarried adults will live alone.

Other Exchange. Gold (1990) used a small, highly educated older sample from a single Southern community to compare sibling relationships among Blacks and Whites. Her conclusion is that Blacks are more likely than Whites to report close and positive ties with siblings, but that this difference is limited to dyads including at least one male. There was no racial difference in closeness among female dyads.

A small study by Suggs (1989) compares predictors of association with siblings among a small sample of Black and White elders from North Carolina. For both racial groups, she found physical proximity an important determinant of contact with siblings; education was positively associated with contact among Black but not White siblings.

Taylor, Chatters, and Mays (1988) used the 1980 Panel Study of Income Dynamics to compare Black, Anglo, and Hispanic respondents on sources named as emergency helpers. Figures drawn from a bar chart show that approximately 15% of Hispanic and Anglo respondents, but 24% of Black respondents, named a sibling as their likely source of emergency assistance. Using a different sample, the National Survey of Black Americans, Chatters, Taylor, and Jackson (1986) again found that nearly one-quarter of African Americans would call on a sibling for help if they were sick or disabled. Chatters, Taylor, and Neighbors (1989) concluded "Siblings are frequently mentioned as members of the informal helper network" (p.). Because the latter analyses were based on the National Survey of Black Americans, no race/ethnic comparisons were possible.

Rossi and Rossi (1990) compared a variety of non-Hispanic White ethnic groups and Blacks on normative obligation to kin. Their results show that Black respondents report significantly lower normative obligation to siblings than most White ethnic groups, but significantly higher obligations to distant kin. Whereas most ethnic groups show a sharply declining level of obligation as kinship becomes more remote, Blacks "draw the line on high obligations much further out in the kindred" (p. 240).

Although scholars often assume that the extended family is stronger in Hispanic than Anglo communities, there is little strong research to support this conclusion (Vega, 1990). Williams (1990) summarized her ethnographic research of Texas communities by concluding that many urbanized, Americanized Hispanics had only ritual contacts with extended families, and that "the mutual aid once associated with the extended kinship system is no longer characteristic of everyday life" (p. 138).

The Problem

Our previous research using the National Survey of Families and Households data set (White & Riedmann, 1992a, 1992b) showed the chief factors encouraging sibling solidarity were a relatively small inner circle (unmarried, no adult children, no living parents), having a sister (especially for women), structural availability (larger number of sibs and closer physical distance, full siblings), higher education and income, and younger age. This list includes many of the factors thought to play a part in race/ethnic patterns of family solidarity. Net of these factors, however, we still found a consistent pattern of race/ethnic differences in sibling solidarity: African Americans have more contact with their sibs, but less actual exchange than do non-Hispanic Whites; Mexican Americans do not differ significantly from non-Hispanic Whites on any dimensions; Asian Americans report significantly greater perceived support from siblings in a hypothetical emergency, but are not significantly different on contact, affection, or actual exchange. Although these measures of solidarity are not exhaustive and structural differences may be incompletely controlled, this research suggests that differences between inner circle, sibship, and respondent characteristics cannot "explain away" race/ethnic effects. An omitted consideration in these analyses is whether cultural differences among race/ethnic groups may prompt individuals to respond differently to similar situations—that is, whether there are interactions by race.

The research reported here extends previous work in several ways. First, it provides descriptive data on race/ethnic differences in sibship characteristics and sibling relationships. Second, it considers coresidence as well as other forms of social exchange. Third, it includes Puerto Ricans, Cubans, and other Hispanics as well as Mexican Americans. Fourth, it includes a measure of immigrant status. Finally, it focuses on additive and interactive paths through which race/ethnicity may affect sibling solidarity.

STUDY DESIGN

Sample

This analysis is based on the National Survey of Families and Households conducted in 1987–88 (Sweet, Bumpass, & Call, 1988). This study includes personal interviews with a national probability sample of 13,017 respondents, representing the noninstitutionalized population of the United States. The response rate was 73.5%. The survey oversampled minority groups, single parents, cohabitors, persons with stepchildren, and the recently married. Because this research benefits from the larger number of minority group members, the sample used in this analysis does not correct for this basis of oversampling. We do, however, use weights to compensate for other bases of oversampling, household size, and differential response rates; the sample has also been weighted to make it match the age and sex composition of the U.S. sample reported by the Current Population Survey. The analysis reported in this chapter includes all those respondents who had living full, step, or half siblings.

Measurement

Dependent Variables. Sibling relationships are measured on four dimensions: coresidence, contact, actual exchange, and potential support.

Coresidence is a dummy variable indicating that the respondent was living in the same household with at least one sibling (full, step, or half). We added a control for whether the respondent *coresided with a parent*. Respondents coresiding with a sibling were omitted from analyses of all other dependent variables.

Sibling *contact* is the sum of two questions, each having a set of response categories ranging from 1 (no contact) to 6 (more than once a week). The questions were: "During the past 12 months, how often did you see any of your full brothers or sisters?" and "During the past 12 months, how often did you talk on the telephone or receive a letter from any of your full brothers or sisters?" The result was an ordinal-level variable with a range of 2 through 12. For respondents who had no full siblings, comparable questions for step/half siblings were substituted. A control variable marked cases with full siblings.

Actual exchange is a dummy variable that indicates whether the respondent gave to or received from siblings: child care, transportation, home repairs, housework, or advice and emotional support in the last month; gifts or loans of $200 or more in the last two years.[1] The question did not distinguish among full, step, and half siblings.

The extent to which siblings were regarded as a source of *potential support* was measured by a series of three questions asking "Who is the one person you would call" if you had an emergency in the middle of the night, needed to borrow $200 in an emergency, or were depressed or confused and needed advice? Approximately 15% of the sample volunteered the answer "siblings" in response to these open-ended questions. We dummied the variable to indicate respondents who listed a sibling in any of the three questions.

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[1] During preliminary analyses, we experimented with several alternative ways of measuring this exchange: counting the number of dimensions of support received/given, separating receiving and giving support, and separating instrumental from social support. Giving and receiving overlapped so much that regression results were virtually identical. Similarly, the dummy variable worked as effectively as the count variable, which was very highly skewed because most respondents reported only one or two types of exchange. Substantively there was no difference in our conclusions about the role of race/ethnicity when instrumental exchanges were separated from giving advice/support, so the analysis is simplified by including both dimensions in the single indicator of social support.

Independent Variables. Dummy variables identify African-, Hispanic-, and Asian-American respondents. Initial analyses separated Hispanics into three origin categories for which NSFH had adequate numbers for analysis (Mexico, Puerto Rico, and other), but subsequent analysis showed that the groups were not significantly different except on the measure of coresidence. To conserve tabular space, the groups are combined for all analyses, and significant differences are pointed out in the discussion of coresidence. Native Americans (n = 49) are excluded entirely.

Control Variables. *Age* is a continous variable. *Gender* is dummied with 1 indicating female and 0 indicating male. *Education* is a continuous variable measuring years completed. *Total family income* includes all family income from both salaries and dividends.[2]

Immigration is measured by dummy variable indicating birth outside the United States.

Proximity is measured by a series of three dummy variables: any within 2 miles, 2 to 25 miles, and from 26 to 300 miles. *Number of siblings* indicates number of living siblings (full, half, and step); *full siblings* is a dummy term marking those respondents with living full siblings. A dummy variable measures whether the sibship includes any *sisters*, and another dummy term, *female/sisters*, identifies the interactive case of women respondents with sisters.

Marital status is a dummy variable identifying those currently married and living with their spouse. *Adult children* is a dummy variable indicating whether respondent has any own children (i.e., not step) over 18, and *young children* indicates children under 18 in respondent's home. Any *parent alive* is a dummy variable.

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[2] Because nearly 25% of respondents did not answer the income question, nonrespondents are coded zero on income and a dummy variable, *income nonresponse*, controls for data absence. The coefficients of this variable are not substantively interpretable and therefore are omitted from the tables.

FINDINGS

The findings section is organized into two parts. We present descriptive data on the various race/ethnic categories, and we examine additive and interactive models of sibling solidarity.

Descriptive Data

Table 5.1 provides descriptive data about the four racial/ethnic categories in this analysis: non-Hispanic Whites, African Americans, Hispanics, and Asian Americans. Superscripts on the table report ANOVAs between each pair of race/ethnic categories controlling for respondent's age. In many cases each group is significantly different from each other group.

Fewer than 10% of adults live with their siblings, although this percentage is approximately doubled for African and Hispanic Americans. This is the only variable on which Hispanic groups differ significantly among themselves (not shown). Replicating Angel and Tienda (1982), we found Puerto Ricans are significantly less likely and Mexican Americans and other Hispanics significantly more likely than all ethnic categories, taken together, to coreside (10%, 15%, and 19%, respectively). Contact among siblings is significantly different for each pair of groups, with African Americans reporting the most and Asian Americans the least contact. These scores translate approximately into contact several times a month for African-American siblings but only monthly for Asian Americans.

A substantial minority of Americans from all racial/ethnic groups are involved in exchange relationships with their siblings. Anglo Americans are most likely to exchange with their siblings, followed by African Americans, and trailed by Hispanic and Asian Americans. Feeling that one can rely on sibs in an emergency, however, displays virtually the opposite pattern, with Asian Americans most likely and Anglo Americans least likely to say that a sibling would be their first source of emergency assistance. The findings are generally consistent with an interpretation that racial/ethnic groups may have different forms of sibling solidarity in adulthood: Some score high on coresidence, others on general exchange, and others on subjective solidarity. No group stands out as disadvantaged overall.

Sibship characteristics differ substantially across these

TABLE 5.1 DESCRIPTIVE STATISTICS, MEANS FOR NON-HISPANIC WHITES, AFRICAN AMERICANS, HISPANICS, AND ASIAN AMERICANS WITH FULL OR STEP/HALF SIBLINGS, NSFH, 1987–88, ADJUSTED FOR AGE

	NonHis-Whites (*N* = 8442)	**African Americans (*N* = 2156)**	**Hispanics (*N* = 1009)**	**Asian Americans (*N* = 136)**
Sibling Solidarity				
Coresidence	$.08^{a}$	$.16^{b}$	$.14^{b.c}$	$.06^{a.d}$
Contact	7.62^{a}	8.39^{b}	7.84^{c}	6.62^{d}
Exchange	$.43^{a}$	$.38^{b}$	$.33^{c}$	$.35^{c.d}$
Perceived social support	$.28^{a}$	$.33^{b}$	$.33^{b.c}$	$.35^{a.b.c.d}$
Sibship Characteristics				
Respondent female	$.52^{a}$	$.56^{b}$	$.52^{a.c}$	$.59^{a,b,c,d}$
Any sisters	$.80^{a}$	$.88^{b}$	$.87^{b.c}$	$.81^{a.d}$
Any sibs 0–2 miles	$.27^{a}$	$.42^{b}$	$.33^{c}$	$.15^{d}$
Any sibs 2–25 miles	$.39^{a}$	$.42^{b}$	$.35^{c}$	$.22^{d}$
Any sibs 25–300 miles	$.38^{a}$	$.29^{b}$	$.23^{c}$	$.13^{d}$
Number of living sibs	3.08^{a}	4.58^{b}	4.91^{c}	$4.12^{b.d}$
Any Full sibs	$.96^{a}$	$.95^{b}$	$.96^{a,b,c}$	1.00^{d}
Any step/half sibs	$.12^{a}$	$.17^{b}$	$.15^{b,c}$	$.10^{a,b,c,d}$
Inner-circle Characteristics				
Married	$.65^{a}$	$.42^{b}$	$.58^{c}$	$.63^{a,c,d}$
Children > 18	$.35^{a}$	$.38^{b}$	$.37^{a,b,c}$	$.26^{d}$
Children < 18	$.37^{a}$	$.40^{b}$	$.43^{b,c}$	$.41^{a,b,c,d}$
Any living parent	$.72^{a}$	$.67^{b}$	$.70^{c}$	$.69^{a,b,c,d}$
Residing with parent(s)	$.12^{a}$	$.18^{b}$	$.14^{c}$	$.06^{ad}$
Respondent's Characteristics				
Family income	$37,894^{a}$	$23,092^{b}$	$20,516^{c}$	$27,976^{d}$
Education	12.73^{a}	11.45^{b}	9.71^{c}	13.49^{d}
Age	43.32^{a}	39.65^{b}	37.12^{c}	34.11^{d}
Immigrated	$.03^{a}$	$.04^{b}$	$.51^{c}$	$.73^{d}$

Note. Means with common superscripts (a, b, c, d,) are *not* significantly different at the $p < .05$ level from other means in that row. Means adjusted for age. Family income is based on those reporting.

racial/ethnic groups. Although some significant difference exists between African and Hispanic Americans, these groups generally share relatively large sibships, close distance to sibs, and a greater likelihood of having stepsibs. Asian Americans are distinguished largely by greater distances from their sibs.

In terms of their inner circles, African Americans are much less likely to be married than members of the other three groups and more likely to reside with a parent, both characteristics are likely to increase relationships with siblings. Hispanic Americans are more likely than African Americans to be married, but share relatively high rates of parental coresidence. Asian Americans are distinctive in their lower likelihood of having adult children or coresiding with parents.

Socioeconomic differences are in the directions expected. The relatively low mean income of Asian Americans (especially compared to their educational mean) is probably attributable to the very high percentage of Asian Americans in this sample who are immigrants (73%). Approximately half of the Hispanics in this sample are immigrants, a factor that undoubtedly plays a role in their low education and income. In the results to follow, we will examine whether immigrant status—our most direct measure of cultural differences—also plays a role in sibling relations.

Regression Results: Additive and Interactive Models

Having established significant race/ethnic differences in sibling relationships, we turn to regression analysis to examine the sources of these differences. Using OLS or logistic regression, depending on the form of the dependent variable, both an additive and an interactive model are examined. The additive analyses add the control variables in a stepwise fashion to examine the extent to which race/ethnic differences are explained by controls for sibship, inner circle, and respondent characteristics. The last step is to consider multiplicative effects. Because theory is so ad hoc in this area, we did not find it a useful guide to eliminate any possible interactions. As a result, we assumed that any race/ethnic category could interact with any of the background variables. This required testing 45 interaction effects for each dependent variable (3 race/ethnic groups × 15 background variables). The results reported in column 5 of each table include all effects that were significant. Results are discussed for each sibling relationship measure separately.

Coresidence

Table 5.2 presents the logistic regression results when sibling coresidence is the dependent variable. A comparison of race/ethnic dummies across steps 1–4 demonstrates that even after all background characteristics (including likelihood of residing with parents) are controlled, African and Hispanic Americans are more likely than Anglo Americans to reside with sibs.

Asian Americans, however, are not significantly different from non-Hispanic Whites on this variable.

Comparing step 4 with step 1, control for distance and inner-circle characteristics (particularly marital status and residing with parents) explains approximately three-quarters of the greater propensity of African Americans to reside with siblings. Tests for interaction showed that only 1 of 15 background variables (a proportion very little greater than chance) had a significantly different effect for African Americans than for others: A larger number of siblings was associated with reduced coresidence for African Americans but higher coresidence for all others.

Hispanics are also more likely to reside with sibs than are non-Hispanic Whites, but the effect of control variables is different than for African Americans: Control for inner-circle characteristics *raises* the coefficient for Hispanics. As the interaction in step 5 demonstrates, being married increases the likelihood of sib coresidence for Hispanics, whereas it decreases it for others. Among Hispanics, it appears that sibship coresidence is part of a strategy of household extension that involves adding collateral members to established husband–wife families rather than an alternative to nuclear families. Because age decreases likelihood of sibling coresidence more for Hispanics than for others, however, it seems likely that this is a strategy of young families and young adults—a finding that accords with Chavez's (1985) observation that sibling coresidence is characteristic of new or illegal immigrants.

Only 3 of 45 interaction effects were statistically significant, suggesting that in general the same factors predict sibling coresidence across all race/ethnic groups: Women and those with sisters, those who reside with parents, and immigrants are more likely to live with siblings, whereas those who have their own children (under or over 18) or living parents are less likely to coreside with siblings. The social class variables have weak effects on this dependent variable, although family income has a modest positive effect when interaction effects are included.

Contact with Siblings

Confining the analysis to respondents without coresiding sibs, we turn to an OLS analysis of contact with siblings. We found that Hispanics, especially African Americans, see significantly more of their siblings than do non-Hispanic Whites;

TABLE 5.2 SIBLING CORESIDENCE, NSFH SAMPLE (LOGISTIC REGRESSION), N = 11,687

	Step 1 Race/Ethnic Chars.		Step 2 Sibling Chars.		Step 3 Inner Circle Chars.		Step 4 Respondent's Chars.		Step 5 Interactive Effects	
	b.	S.E.	b.	S.E.	b.	S.E.	b.	S.E.	b.	S.E.
African American	.897***	.078	.674***	.094	.320**	.119	.248*	.123	.662**	.206
Hispanic	.685***	.103	.686***	.125	.856***	.151	.499**	.182	1.356**	.433
Asian American	.075	.302	.418	.347	.734	.441	.606	.476	.683	.474
Age	.126***	.005	-.103**	.005	.036***	.006	-.033***	.006	.031***	.006
X Hispanic									-.045**	.014
Sibship Characteristics										
R females			-.174	.185	.579*	.235	.625**	.239	.592*	.241
Sisters			.211	.145	.398*	.184	.417*	.187	.396*	.190
F with sisters			.369	.204	.506*	.257	.549*	.262	-.518*	.263
Any < 2 miles			2.999***	.105	2.798***	.116	2.823***	.122	2.808***	.122
Any 2–25 miles			-.431***	.086	-.497	.107	-.460***	.110	-.476***	.110
Any 26–300 miles			-.445***	.097	-.563***	.120	-.567***	.125	-.577***	.125
Number sibs			.003	.017	.134***	.020	-.127***	.021	-.164***	.026
X Af Am									-.106**	.040
Any fulls			.142	.217	.350	.263	.431	.270	-.436	.272
Inner Circle Chars.										
Married					1.433***	.147	-1.317***	.155	-1.734***	.187
X Hispanic									1.536***	.327
Children > 18					1.270***	.211	-1.287***	.214	-1.207***	.215
Children < 18					-.52***	.137	-.741***	.143	-.770***	.146
Parents alive					-.964***	.182	-.815***	.192	-.854***	.196
Reside w/parent					2.565***	.117	1.845***	.134	1.835***	.135
Respondent's Chars.										
Total family income (000s)							.0004	.002	.005*	.002
Education							.042	.022	.043	.022
Immigrated							.440*	.197	.377	.198
-2 log likelihood ratio	5768.13		4283.84		2945.68		2797.60		2761.57	
Constant	1.573		-.710		-2.321		-2.801		-2.819	
df	4		12		17		21		24	

Note. Beginning -2 log likelihood ratio is 7550.09.
*p < .01. **p < .05. ***p < .001.

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Asian Americans see substantially and significantly less. Not only the level, but also the determinants, of contact differ significantly by race/ethnic group.

Comparing steps 1 through 4 of Table 5.3 shows that more than half of the greater propensity of African Americans to contact their siblings is explained by sibship characteristics, particularly closer distance and a larger number of full sibs. Six of 15 interaction effects were statistically significant for African Americans, suggesting that sibling contact has somewhat different predictors than for the other groups: African-American contact with siblings is not as strongly affected by distance, neither young children nor a spouse decrease sibling contact for African Americans, living parents increase contact for African Americans only, and immigration actually increases African-American contact with siblings.

The modest but significant effect of Hispanic ethnicity on sibling contact is largely explained by sibling characteristics. After these are controlled, there is no difference between Hispanic and non-Hispanic Whites. Only one interaction effect is significant for Hispanics: Number of siblings increases contact more for Hispanics than for other groups.

The strikingly lower likelihood that Asian Americans will be in contact with their siblings appears to be due largely to sibship characteristics, particularly distance. Two interaction effects demonstrate that living in close proximity increases contact more for Asians than for others. The jump in the main effect for Asians in column 5 demonstrates the effect of Asian ethnicity when distance is greater than 300 miles (i.e., when the distance interactions are zero). For the 73% of Asian respondents who are migrants, this distance is likely to be 6,000 miles rather than 500 miles, and it is not surprising that they have lower contact with their siblings.

Exchange of Social Support

In contrast with the evidence on coresidence and contact, Table 5.4 shows that African and Hispanic Americans are *less* likely than non-Hispanic Whites to exchange social or instrumental support with their siblings. Asian Americans are not significantly different from non-Hispanic Whites on this dimension, although we do find (step 5) that Asian Americans who live a medium distance (2–25 miles) from their siblings are

TABLE 5.3 CONTACT AMONG ADULT SIBLINGS, NSFH SAMPLE (OLS), *N* = 10,729.

	Step 1 Race/Ethnic Chars.		**Step 2 Sibling Chars.**		**Step 3 Inner Circle Chars.**		**Step 4 Respondent's Chars.**		**Step 5 Interactive Effects**	
	b.	**S.E.**	**b.**	**S.E.**	**b.**	**S.E.**	**b.**	**S.E.**	**b.**	**S.E.**
African American	.840***	.071	.390***	.063	.377***	.064	.384***	.064	.057	.140
Hispanic	.256**	.099	.085	.086	.086	.086	.196	.098	.557	.407
Asian American	1.139***	.249	.521*	.210	.544**	.210	.451*	.220	.904***	.260
Age	.034***	.002	.027***	.001	.023***	.002	.022***	.002	.022***	.002
Sibship Characteristics										
R female			.003	.108	.037	.109	.048	.109	.052	.108
Sisters			.059	.089	.070	.088	.080	.088	.094	.088
F with sisters			.704***	.119	.687***	.119	.677***	.119	.678***	.119
Any < 2 miles			2.517***	.052	2.501***	.052	2.501***	.052	2.569***	.059
X Af Am									.340**	.126
Any 2–25 miles			1.846***	.047	1.857***	.047	1.863***	.047	1.848***	.047
X Asian									1.701***	.498
Any 26–300 miles			.196***	.048	.204***	.048	.194***	.048	.264***	.052
X Af Am									.465***	.130
X Asian									1.603*	.630
Number sibs			.009	.010	.016	.010	.022*	.010	.017	.010
Any fulls			.703***	.116	.689***	.116	.666***	.116	.615***	.121
X Hispanic									.854*	.411
Inner Circle Chars.										
Married					.121*	.953	.127*	.054	.203***	.060
X Af Am									.377**	.126
Children > 18					.215**	.067	.211**	.067	.207**	.067
Children < 18					.200***	.056	.188***	.056	.230***	.062
X Af Am									.343**	.130
Parent alive					.075	.063	.063	.069	.009	.074
X Af Am									.307*	.135
Respondent's Chars.										
Total family income (000s)							.001	.0007	.001	.0007
Education							.016	.009	.017	.009
Immigrated							.150	.097	.269*	.105
X Af Am									.877**	.268
R^2	.06		.33		.34		.34		.34	
Constant	8.952		6.205		6.187		5.871		6.015	
df	4		12		16		20		29	

$^{*}p < .05$. $^{**}p < .01$. $^{***}p < .001$.

TABLE 5.4 EXCHANGE AMONG ADULT SIBLINGS, NSFH SAMPLE (LOGISTIC REGRESSION), *N* = 11,142.

	Step 1 Race/Ethnic Chars.		Step 2 Sibling Chars.		Step 3 Inner Circle Chars.		Step 4 Respondent's Chars.		Step 5 Interactive Effects	
	b.	S.E.	b.	S.E.	b.	S.E.	b.	S.E.	b.	S.E.
African American	.194***	.055	-.353***	.059	-.351***	.061	.269***	.062	.759***	.200
Hispanic	.446***	.077	.539***	.081	-.544***	.082	-.126	.095	.145	.158
Asian American	.229	.185	.087	.189	-.119	.189	.009	.203	.221	.220
Age	.041***	.001	.042***	.001	.026***	.002	.026***	.002	.028***	.002
X Af Am									.014***	.004
Sibship Chars.										
R female			.038	.102	.052	.102	.100	.103	.122	.104
X Hispanic									.548***	.164
Sisters			.181*	.083	.190*	.083	.224**	.084	.197*	.084
F with sisters			.288*	.112	.281*	.112	.263*	.113	.302**	.114
Any < 2 miles			.583***	.048	.599***	.048	.725***	.050	.732***	.050
Any 2-25 miles			.396***	.043	.400***	.044	.473***	.045	.472***	.045
Any 26-300 miles			.244***	.045	.250***	.045	.207***	.046	.197***	.046
X Asian									1.524*	.698
Number sibs			.024**	.009	.028	.009	.052***	.010	.070***	.112
X Af Am									.049*	.202
Any fulls			.419***	.112	.407***	.112	.325**	.113	.325**	.113
Inner Circle Chars.										
Married					.045	.050	.193***	.053	.220***	.053
Children > 18					.427***	.064	.335	.066	.336***	.066
Children < 18					.113*	.051	.057	.052	.107*	.054
X Hispanic									.429**	.166
Parent alive					.307***	.065	.174**	.067	.171*	.067
Respondent's Char.										
Total family income (000s)							.004***	.0007	.003***	.0007
X Af Am									.008**	.005
X Hispanic									.013	.004
Education							.011**	.009	.113***	.009
Immigrated							.273**	.097	-.288**	.098
-2 log likelihood ratio	13553.299		13097.18		13015.56		12694.79		12633.72	
Constant	1.402		.272		-.517		.896		1.892	
df	4		12		16		20		27	

Note. Beginning -2 log likelihood ratio is 14589.55.
**p* < .05. ***p* < .01. ****p* < .001.

more likely than non-Hispanic Whites to exchange with their siblings.

A comparison of steps 1 through 4 suggests that African and Hispanic Americans exchange less with their siblings *despite*, rather than because of, sibship characteristics. That is, when sibling characteristics that encourage exchange (having sisters, being a female with sisters, having full siblings, and close proximity) are controlled, the negative effect of African-American or Hispanic identification actually becomes larger. Three variables had significantly different effects for African Americans than for others: the lower exchange associated with age was less sharp for African-American siblings, the number of siblings had a less positive effect, and family income had a significantly stronger impact for African Americans than for other groups. When these interaction effects are in the equation (column 5), the negative coefficient for African Americans jumps strikingly. This main effect when the interaction terms are zero (i.e., when age and income are zero) demonstrates that the negative effect of African-American racial identification on sibling exchange is greatest among those who are young and poor. This is consistent with Taylor's findings regarding the relative isolation from family support among the lowest income groups of Black Americans.

Three of 15 interaction effects are also significant for Hispanics: Among Hispanics only, exchange is *lower* among women than men and among those with young children. Although the effect is much smaller for Hispanics than for African Americans, family income has a significantly stronger positive effect on Hispanic exchange with siblings than on that of non-Hispanic Whites.

Perceived Supportiveness

When we turn to subjective supportiveness as opposed to actual exchange (Table 5.5), we find that African and Hispanic Americans are significantly more likely to specify a sibling as a first source of emergency assistance. These significant effects are virtually eliminated by a control for sibship characteristics, suggesting that factors of distance, gender, number, and full status explain the race/ethnicity effects. Asian Americans also report greater reliance on sibs than do non-Hispanic Whites, but in this case differences grow rather than decrease when sibship characteristics are controlled.

TABLE 5.5 PERCEIVED SOCIAL SUPPORT FROM ADULT SIBLINGS, NFSH SAMPLE (LOGISTIC REGRESSION), *N* = 11,142.

	Step 1 Race/Ethnic Chars.		Step 2 Sibling Chars.		Step 3 Inner Circle Chars.		Step 4 Respondent's Chars.		Step 5 Interactive Effects	
	b.	S.E.	b.	S.E.	b.	S.E.	b.	S.E.	b.	S.E.
African American	273***	.055	.014	.060	.011	.061	.027	.062	.618***	.177
Hispanic	.287***	.076	.085	.081	.072	.082	.166	.095	.158	.134
Asian American	.398*	.186	.512**	.193	.498*	.193	.407*	.205	.071	.268
Age	.009***	.001	.007***	.001	.006*	.002	.005*	.002	.006**	.002
X Af Am									2.598***	.242
Sibship Chars.										
R female			.628***	.116	.634***	.117	.616***	.117	.617***	.118
Sisters			.125	.087	.128	.087	.117	.087	.122	.088
F with sisters			.690***	.126	.687***	.126	.679***	.127	.693***	.127
Any < 2 miles			.693***	.048	.688***	.048	.728***	.049	.772***	.052
X Hispanic									.416*	.163
Any 2–25 miles			.569***	.045	.571***	.045	.604***	.046	.600***	.046
X Asian									1.193*	.486
Any 26–300 miles			.161***	.047	.164***	.047	.156***	.048	.160***	.048
Number sibs			.099***	.009	.099***	.009	.109***	.010	.111***	.010
Any fulls			.916***	.148	.913***	.148	.882***	.148	.878***	.148
Inner Circle Chars.										
Married					.065	.052	.111*	.054	.138*	.054
Children > 18					.238***	.067	.212**	.067	.227***	.067
X Asian									1.305*	.614
Children < 18					.129*	.055	.120*	.055	.130*	.056
Parent alive					.255***	.068	.296***	.069	.305***	.069
Respondent's Chars.										
Total family income (000s)							.003***	.0006	.002**	.0007
X Af Am									.013***	.003
X Hispanic									.009*	.004
Education							.041***	.009	.040***	.009
Immigrated							.063	.097	.071	.097
-2 log likelihood ratio	12936.02		12179.94		12144.80		12066.36		12019.43	
Constant	.609		-2.235		-2.035		-2.688		-2.598	
df	4		12		16		20		26	

Note. Beginning -2 log likelihood ratio is 13025.40.
**p* < .05. ***p* < .01. ****p* < .001.

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Only a handful of significant interactions were found, but the effect of these interactions on the main effect for African Americans is striking. The positive effects of family income are stronger for African Americans, as are the negative effects of older age. When these two interaction effects are controlled (column 5), the previously positive main effect for African Americans becomes significant and negative. This turnaround suggests once again that it is the young and poor who are particularly disadvantaged.

The positive impact of income on sibling reliance is approximately 3 times greater for Hispanics than for other groups, but Hispanic reliance on siblings is less likely to be increased by very close proximity. Asian-American reliance on siblings is more likely to be positively affected by moderate proximity. Whereas the rest of the sample reports less reliance on siblings when they have adult children, Asian Americans report more. Among a population in which three-quarters are immigrants, it is possible that these respondents find their siblings to be more comfortable confidantes than they find their probably more Americanized children to be.

DISCUSSION AND CONCLUSION

In this chapter we have explored the differences in sibling relationships across four race/ethnic groups: non-Hispanic Whites, African Americans, Asian Americans, and Hispanic Americans. Rather than summarize these complex findings in detail, we consider two issues: Is this aspect of the extended family stronger in minority families? Are the differences we observe due to culture or circumstance?

Stronger Minority Extended Families?

Results indicate a complex picture in which there are many significant differences, but no group has consistently stronger or weaker ties across the variety of measures of sibling relationships examined here. As the qualitative literature on strengths of the minority family suggests, initial results for African and Hispanic Americans showed stronger ties on three of four dimensions: They are more likely to reside with their siblings, to have contact with them, and to perceive them as sources of emergency support. These positive effects appear to be largely due to sibship characteristics favorable to sibling ties, specifically larger sibships and closer distances.

Against this generally positive picture must be placed the negative coefficients for actual exchange and, in particular, the finding that it is the poorest and, among African Americans, the youngest who are most likely to be left out of both objective and subjective sibling exchange relationships. From this complex evidence, we conclude that this part of the African- and Hispanic-American extended family is not clearly stronger, and may even be weaker, than that of non-Hispanic Whites. Similar to findings in earlier studies using other definitions of extended family support (Hofferth, 1984; Hogan et al., 1990; Tienda & Angel 1982), we find that the only clear evidence of greater supportiveness comes from greater likelihood of coresidence.

One might be tempted to conclude that minority individuals, who are disproportionately disadvantaged, share what they have, including their homes. The measures of actual and subjective exchange used in this analysis, however, are, if anything, even less demanding on economic resources than is coresidence. The measures are dominated by questions about advice, child care, or other low-cost services. Preliminary analysis (not shown) showed no substantive differences in effects when exchange was separated into economic versus purely social kinds of support. We are thus inclined to attribute the greater likelihood of coresidence to cultural differences that place less importance on the privacy or boundedness of the nuclear family.

Cultural Differences or Social Class?

Competing explanations of need versus culture have been brought forward previously to explain the greater cohesiveness (and especially coresidence) of minority families. Turned on its head, we can also ask about the role of culture versus low income in explaining the reduced likelihood of exchange among African and Hispanic Americans.

For measures of objective and subjective exchange with siblings, our findings show that social class makes more of a difference among African and Hispanic Americans than it does among non-Hispanic Whites. This finding reinforces an argument that Wilson (1987) and Taylor (1990) have made: Rather than being universally characterized by disadvantage, minority communities are marked by very strong social class effects. On the variables analyzed here, class appears to have more effect among African- and Hispanic-American communities than among non-Hispanic Whites. This may be a threshold effect (disadvantaged minorities are more disadvantaged than are disadvantaged non-Hispanic Whites). It certainly augers against any assumption that there is a monolithic African-American or Hispanic culture that supports extended family relationships.

The most direct measure of culture in these analyses is the indicator of immigrant status for Hispanic and Asian Americans. Generally, the results do not suggest that culture has a strong or consistent effect independent of structural factors such as distance and education. Except for the measure of coresidence and among African-American immigrants, contact, the main effect of immigrant status, appears to be negative.

Overall, we tested 60 interaction effects for each race/ethnic group (15 control × 4 dependent variables): 12 were significant for African Americans, 7 for Hispanics, and 4 for Asians. These findings suggest that a claim for cultural differences in the predictors or form of sibling relationships are strongest in the case of African Americans and weakest in the case of Asians.

The strongest evidence of cultural differences, however, is in the forms of sibling relationships rather than in the predictors. Clearly, coresidence is a more likely form of sibling aid among African and Hispanic Americans than among Asian Americans and non-Hispanic Whites. Whatever may be the differences in *family* extension, *household* extension is more likely among African and Hispanic Americans.

Conclusion

Based on this analysis of four dimensions of adult sibling relationships across four racial/ethnic groups, we conclude that the similarities far outweigh the differences. The majority of race/ethnic differences noted are explained by variables that generally work in the same way for people of different races/ethnicities: those with large sibships, with nearby sibs, without spouses or unmarried children, and with higher family incomes have stronger sibling relationships. Although there are some exceptions, the distinction between inner and outer circle seems to operate very similarly for all groups.

There is no consistent evidence here that one race/ethnic group has *stronger* sibling ties than any other, or that any group is categorized by weakness or a "broken" family. Rather, there seem to be significant differences across groups in the form that sibling solidarity takes. The strength of the Hispanic and African-American sibship is a greater willingess to take siblings into one's home; Asian Americans are distinguished by a greater willingness to call on siblings despite distance. Non-Hispanic Whites are distinguished by relatively high levels of actual exchange of social support. Overall, the evidence here is of surprisingly strong sibling relationships despite, or perhaps because of, much-discussed declines in the nuclear family.

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6

PERSONALITY AND SIBLING RELATIONSHIPS

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Having a sibling can be wonderful, terrible, or even both. Perhaps more than any other type of close relationship, those between siblings vary widely. The affective tone can range from very positive to very negative. Patterns of interaction can be symmetrical when the siblings are close in age, or they can be assymetrical when one is much older than the other.

During the last two decades, investigators have become interested in identifying the bases for such individual differences in sibling relationships. Our own work has been guided by the model depicted in Figure 6.1 (Furman & Buhrmester, 1985). Specifically, we propose that the characteristics of sibling relationships are influenced by: (a) family constellation variables; (b) parent-child relationships; and (c) the cognitive, social, and personality characteristics of the children. Similar models of factors associated with sibling relationships have been posited by other investigators (e.g., Stoneman & Brody, 1993).

The early literature on siblings focused on the role of family constellation variables, such as birth order, sex of sibling, and age spacing in the dyad (see Ernst & Angst, 1983, Sutton-Smith & Rosenberg, 1970). Most of this work was concerned with the links between constellation variables and personality traits, intelligence, or other characteristics of the children. A more limited amount of work directly examined the links between these variables and sibling relationship characteristics (e.g., Bowerman & Dobash, 1974; Furman & Buhrmester, 1985; Koch, 1960; Minnett, Vandell, & Santrock, 1983). Typically, the associations

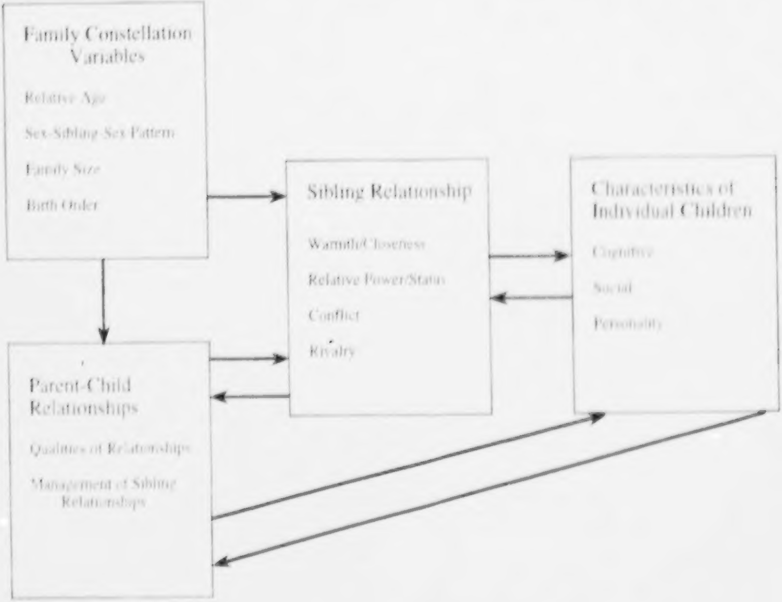
Family Constellation Variables
Relative Age
Sex-Sibling-Sex Pattern
Family Size
Birth Order
Sibling Relationship
Warmth/Closeness
Relative Power/Status
Conflict
Rivalry
Characteristics of Individual Children
Cognitive
Social
Personality
Parent-Child Relationships
Qualities of Relationships
Management of Sibling Relationships

FIGURE 6.1

have not been found to be very strong, except that the distribution of power in the relationship is closely associated with the relative ages of the two children (Furman & Buhrmester, 1985).

More recent work has focused on the links between sibling relationships and other familial relationships (see reviews by Dunn, 1988; Furman, in press; Furman & Giberson, in press). Warmth and positive interactions in parent–child and siblings relationships are associated with one another, as are conflict or punitive interactions in the two relationships (Brody, Stoneman, McCoy, & Forehand, 1992; Bryant & Crockenberg, 1980; Stocker & McHale, 1992; Volling & Belsky, 1992). Furthermore, differences in the two children's relationships with parents are predictive of conflict or jealousy between siblings (Brody, Stoneman, & Burke, 1987a; Brody et al., 1992; Stocker, Dunn, & Plomin, 1989). Finally, the characteristics of the parent's marital relationship are related to the characteristics of the children's sibling relationship (Brody, Stoneman, & Burke, 1987b; Furman & Giberson, in press; MacKinnon, 1989).

Although these studies have clearly documented links among the different family relationships, the associations have typically been moderate in size. A significant amount of the variance in sibling relationships remains to be explained by other factors.

In this chapter, we discuss the role personality variables may play in sibling relationships. After some prefatory comments about the concept of personality, we review the existing literature that has examined such links. Then we present a description of some recent work in our laboratory. Finally, we discuss some possible directions for subsequent work.

PERSONALITY IN CONTEMPORARY PSYCHOLOGY

Before discussing the links between personality and sibling relationships, a few comments should be made about current conceptualizations of personality. In the late 1960s, the concept of personality traits was seriously criticized (Mischel, 1968). In particular, serious questions were raised about how consistent behavior was across situations and how predictive traits were of behavior. These criticisms generated a flurry of conceptual papers and empirical studies (see e.g., Bem & Allen, 1974; Bowers, 1973; Krahe, 1992; Magnussen & Endler, 1977; Pervin & Lewis, 1978). This work did not result in an abandonment of the concept of personality, but instead brought about a clearer articulation of the nature of traits. In particular, traits are conceptualized as dispositions to behave in particular ways. A disposition does not mean that one will always behave in a particular way, just that one is inclined to or tends to behave in that way. Other personality characteristics or situational factors may preempt particular dispositions in specific instances. Accordingly, a trait may not be very predictive of behavior in a particular situation, but it should be and is predictive of patterns of behavior across a series of appropriate situations (Epstein, 1979).

Advances have also been made in the identification of the primary dimensions of personality. Research on the dimensions of personality began with the work of Allport and Odbert (1936), who examined dictionary entries and selected more than 4,000 terms that they thought represented stable personality traits. Through a variety of subjective and objective methods, Cattell (1943) reduced the list of 4,000 trait descriptors to a more manageable list of 171 terms and subsequently to a list of 35 groupings of traits (Cattell, 1945a). Factor analyses of ratings on these 35 trait variables yielded 12 factors (Cattell, 1945b). Cattell still retained too many factors by today's criteria for factor analyses.

Some years after Cattell's initial reduction, Fiske's (1949) and Tupes and Christal's (1961) analysis of trait ratings yielded the dimensions that have come to be known as the Five-Factor Model. These five dimensions are extraversion, agreeableness, conscientiousness, neuroticism, and openness to experience. The Five-Factor Model has been shown to be the underlying structure in self-report questionnaires and in lists of adjectives derived by other means; in fact, the five factors even emerge on measures that were thought to have different underlying structures. Finally, studies have found that the structure appears in a wide range of cultures, including Germany, the Netherlands, Japan, China, and the Philippines (see John, 1990, 1991, for reviews; and Block, 1993, for an alternative view).

Although some investigators interested in personality development have begun to examine the Five-Factor Model (see Digman, 1989; Digman & Inouye, 1986; Graziano & Eisenberg, in press; Halverson, Kohnstamm, & Martin, in press), most developmentalists interested in traitlike characteristics have focused on temperamental variables. The nine temperament dimensions derived from Chess and Thomas's classic New York longitudinal study guided this field for many decades (Thomas, Chess, Birch, Hertzig, & Korn, 1963). Recently a number of alternative conceptualizations and measures of temperament have emerged as the field has flourished (see Goldsmith & Rieser-Danner, 1990, for a review). Aside from the work on temperament, the existing literature on personality development primarily consists of investigations of specific traits, such as ego control (Block, 1971), Type A personality (Matthews, 1981) or self-monitoring (Graziano, Leone, Musser, & Lautenschlager, 1987). As yet, a comprehensive framework for conceptualizing personality development has not emerged, although several authors are beginning to speculate about the nature of the links between early temperament and later personality (Hagekull, in press; Rothbart & Ahadi, in press).

LINKING PERSONALITY AND SIBLING RELATIONSHIPS

Intuitively, one would expect that the personality characteristics of individuals would be related to the characteristics of their relationships with their siblings. Surprisingly little empirical research, however, has focused on the links between the two.

As part of a large study of 40 same-sex sibling pairs, Brody and associates (1987a) collected maternal ratings of activity level, emotional intensity, and persistence. Siblings' prosocial behavior, agonistic behavior, and verbalizations were coded while dyads were playing with their mothers and while playing alone. The temperament dimensions were related to the behavior of the siblings playing alone, particularly to agonistic behavior. The activity level and emotional intensity of each child in the dyads were positively correlated with agonistic behavior, whereas the persistence of each child was negatively related. These patterns were particularly consistent for female dyads. Activity level and persistence by the younger sibling in the male dyads were somewhat associated with prosocial behavior and verbalizations, but less consistently. In general, the temperament of the younger sibling was more consistently related to the relationship dimensions than was that of the older sibling. Interestingly, none of the temperamental variables was predictive of sibling interactions when the mother was present, perhaps reflecting the lower rate of interchanges between siblings in that context.

Stocker and associates (1989) also examined the links between temperamental characteristics and sibling relationship qualities. They gathered maternal ratings of Buss and Plomin's (1984) five temperamental dimensions and three other indices of emotionality. Measures of the sibling relationship were derived from naturalistic observations, observations of structured tasks, and maternal interviews. Relatively few associations were found. In part, the limited number of relations may reflect the fact that mothers were present during the structured tasks. On the unstructured task, positive interactions were negatively related to temperamental ratings of the frequency of being emotionally upset, a finding consistent with Brody and associates' (1987a) results.

More recently, Munn and Dunn (1989) examined the relations between temperament and the sibling relationships of preschool-aged children. Mothers completed the Behavioral Style Questionnaire (Fullard, McDevitt, & Carey, 1984), which assesses the nine temperamental dimensions from the Chess and Thomas system (Thomas et al., 1963). Naturalistic observations were gathered of the duration of joint pretend play, joint physical association play, joint nonpretend play, and conflict when the younger child was 24 and 36 months old. Relatively few consistent relations were found. At both time periods, however, nonadaptability of the older sibling was negatively related to joint pretend play, whereas distractibility of the older sibling was positively related. Additionally, the negative moods of both children were associated with conflict at 24 months, but not at 36 months. Finally, differences in the two children's approach–withdrawal, nonadaptability, intensity, and negative mood were all associated with conflict at 36 months but not at 24 months.

THE FIVE-FACTOR MODEL AND RELATIONSHIPS

Before discussing the previous studies, we describe the results of a recent project conducted in our laboratory. Like the other investigators, we were interested in the role individual characteristics play in sibling relationships, but we examined the dimensions in the Five-Factor Model, rather than temperamental characteristics.

The participants included 56 triads of mothers and two school-aged children. The average ages of the younger and older children were 9.43 and 11.33 years, respectively; the gender compositions of the dyads were approximately balanced. Most were from suburban Caucasian middle-class families. Each of the participants completed the Children's Personality Questionnaire (CPQ; Porter & Cattell, 1975) and the Sibling Relationship Questionnaire (SRQ; Furman & Buhrmester, 1985). The children completed the questionnaires about their own personality characteristics and their relationships with their siblings, whereas the mothers completed the measures in reference to their children and their children's relationships with each other.

The SRQ is a 53-item self-report instrument that assesses the warmth, conflict, relative power, and competition for parental attention in the sibling dyad. Composite factors were derived by averaging the two children's and mother's reports on the relationship. These composites provided highly reliable estimates of each of the relationship dimensions ($M\ \alpha = .82$).

The CPQ is a 140-item self-report measure based on the Sixteen Personality Factor Questionnaire (16PF; Cattell, Eber, & Tatsuoka, 1970). In order to form five-factor scales, 10 raters sorted each of the items into one of the five dimensions. After all items were sorted, they assigned a rating on a 7-point Likert scale for how prototypical they believed the item was for the dimension to which they had assigned it. Items were assigned to a scale if they met the following criteria: 80% or greater category agreement among judges, and a mean prototypicality judgment above 4. Based on these criteria, 63 of the 140 items on the CPQ were included in the five-factor scales. Confirmatory factor analyses with a larger sample of children indicated a good fit of the proposed model to the data (Lanthier, 1993b).

Table 6.1 presents the correlations between the sibling relationship qualities and the two children's personality characteristics. Several patterns warrant mentioning.

First, personality traits were more often associated with conflict than with warmth. Six of the ten correlations with conflict were significant, whereas only two of the ten were with warmth. This pattern has emerged relatively consistently in the different studies and is discussed shortly.

TABLE 6.1 CORRELATIONS BETWEEN SIBLING RELATIONSHIP DIMENSIONS AND YOUNGER AND OLDER CHILDREN'S FIVE-FACTOR TRAITS

	Dyad Member		
	Older	**Younger**	**R^2**
Warmth			
Extroversion	.10	.19	.05
Agreeableness	.24†	.16	.07
Conscientiousness	.23†	.40**	.21**
Neuroticism	−.13	−.15	.04
Openness to Experience	−.27*	−.18	.09
Conflict			
Extroversion	−.06	−.23†	.07
Agreeableness	−.35**	−.38**	.23**
Conscientiousness	−.46	−.43**	.36**
Neuroticism	.27*	.15	.08
Openness to Experience	.27*	.50**	.27**
Relative Power			
Extroversion	−.38**	−.07	.16*
Agreeableness	−.36**	−.29*	.17*
Conscientiousness	−.47**	−.01	.21*
Neuroticism	.56**	.08	.31**
Openness to Experience	.19	.11	.05
Competition for Parental Attention			
Extroversion	−.04	−.14	.03
Agreeableness	−.10	−.24†	.08
Conscientiousness	−.05	−.37**	.17*
Neuroticism	.27*	.18	.12†
Openness to Experience	−.15	.16	.11

†$p < .10$. *$p < .05$. **$p < .01$.

Second, the older child's characteristics were more strongly associated with the distribution of power in the relationship than were those of the younger child. Because older siblings almost always have more power in the relationship (Furman & Buhrmester, 1985; Vandell, Minnett, & Santrock, 1987), their personality characteristics may have more influence in determining the degree to which this power is wielded.

Third, of the different personality variables, conscientiousness was most often associated with the relationship dimensions. Not surprisingly, it was positively associated with warmth and negatively associated with conflict, relative power, and parental competition. The second most consistent predictor was agreeableness, which was negatively related to both conflict and differences in power in the relationship. In some related work we examined the links between five-factor traits and other close relationships. In one study, agreeableness and conscientiousness were found to be the most consistent predictors of perceived warmth in best friendships (Lanthier & Furman, 1992a). In another study, parents' and children's levels of agreeableness and conscientiousness were consistently related to different indices of perceived warmth in parent–child relationships (Lanthier, 1993a). Thus, the pattern of personality correlates appears to be relatively consistent across different types of relationships. In other research, we found that conscientiousness and agreeableness were related to social skills, which may account for the associations with relationship qualities (Lanthier, 1993b).

Finally, we examined the ways that children's personality characteristics might mesh or interact to predict the relationship dimensions. That is, not only may the children's personality traits per se be predictive, but also their characteristics relative to one another. Munn and Dunn's (1989) finding that differences in temperament were associated with conflict could be evidence of such, although their findings could also reflect the impact of having at least one child with a difficult temperament. In any case, ample evidence exists in the adult social-psychological literature for the effects of similarity on interpersonal attraction and mate selection (Berscheid & Walster, 1978; Hinde, 1979; Murstein, 1976).

To examine the potential role of the meshing of characteristics, we conducted a series of regression analyses using three predictors of sibling relationship characteristics: (a) the older child's score on a particular trait, (b) the younger child's score on the same trait, and (c) the multiplicative interaction of the two children's scores. In effect, the last predictor assesses the degree of similarity or difference in the other two's characteristics. The effects of the younger and older child's characteristics were essentially identical to those found in the correlational analyses reported earlier. Interestingly, none of the interaction terms were found to be significant.

Several possibilities may account for the absence of findings regarding meshing of the two children's personality traits. Matching of characteristics may not be terribly important in these relationships. In fact, most of the existing work on the effects of similarity have either looked at the selection of partners or friends or the early stages of relationship development. Sibling relationships are both nonvoluntary and have a long history by the time the children are in school. Moreover, the children may seek out somewhat different niches, which may make differences in personality characteristics more normative. After all, the existing literature has found that siblings are no more alike than unrelated children once shared genetic factors have been taken into account (Plomin & Daniels, 1987; Rowe & Plomin, 1981). Because siblings certainly share more common experiences than do two strangers, we believe that other factors might be fostering differences that counteract any effect these common experiences may have.

On the other hand, as part of the same study, we found that similarity in the experience of stress was associated with more positive perceptions of the sibling relationship (Lanthier & Furman, 1992b). When both had experienced a high amount of stress (or a low amount), the relationship was described as relatively warm and low in conflict. The reverse pattern was found when one had experienced a lot of stress and the other had not. Thus, some types of similarity may be predictive, but perhaps not similarity of personality characteristics per se.

A more sophisticated model of the ways that children's personality traits are associated with sibling relationship characteristics may also be needed. Goodness of fit models, such as those proposed in the temperament literature, go beyond the similarity models that have appeared in the social psychological literature (Chess & Thomas, 1991). Goodness of fit occurs when the person's temperament is adequate to master the demands of his or her environment. Poorness of fit occurs when the person's temperament is inadequate to handle the environmental demands. Perhaps a goodness of fit model would better explain how personality traits relate to sibling relationship quality. In this instance, it may be that children's expectations for their sibling's personality traits are the important mediators in these domains, rather than the children's absolute score or the similarity of the two scores. For example, some children may find it important for their siblings to be extroverted. When these children are faced with an introverted sibling, poorness of personality-environment fit would occur, and we may expect less warmth and greater conflict in the relationships. For other children, however, having an introverted sibling may not pose particular difficulties, and the fit between the two of them may still be satisfactory.

In summary, the present study and past studies provide evidence of links between sibling relationships and temperamental or personality characteristics. The precise nature of these links, however, is not evident as the findings vary substantially from study to study. Interpreting such differences is difficult because the studies vary in subject population, variables assessed, and methodology.

One consistently found pattern, however, is that personality and temperamental characteristics are more related to conflict in the relationship than they are to warmth. Several explanations seem possible. First, it may be more difficult to assess positive features of a relationship than negative ones. For example, the amount of self-disclosure among older pairs of siblings may be a reasonable index of warmth in the relationship, but it is difficult to structure a situation that inherently pulls for such interchanges. For better or worse, investigators have had less problems finding situations that elicit conflict between siblings.

To assess positive features, one would want to find a situation in which there is marked variation in siblings' behavior and such variation is reflective of the nature of their relationship. Unfortunately, when two siblings are presented with most structured observational tasks, they are required to interact together as there is little else to do. Thus, these tasks may mask differences in their proclivities to do so. The alternative of collecting naturalistic observations also presents difficulties because the frequency of interacting together during a particular naturalistic observation may be influenced by many factors other than their proclivities to interact with one another. Short observational samples are very prone to random noise or error; thus, they are not likely to provide very accurate estimates of the actual pattern of interactions (see Waters, 1978). Most investigators have not had the resources to observe enough times to ensure that they have a reliable index of the pattern of sibling interactions.

Positive features of a relationship may also not be as apparent in interactions as conflict is. For example, how exactly are feelings of admiration or affection manifested behaviorally? Elsewhere we have found less agreement among parents and siblings about the positive features of the sibling relationship than about negative ones (Furman, Jones, Buhrmester, & Adler, 1988).

The results of several studies also suggest that children's temperamental characteristics may play a significant role when they are interacting alone, but not when others are present (e.g., Brody et al., 1987a). Certainly, the characteristics of the parent would also be likely to play a role in shaping the interactions of the triad, but it is not clear why the parent's presence would eliminate (vs. weaken) the role of the children's characteristics. Perhaps children's "true personalities" come out more when alone than with parents.

Alternatively, the problem may be in these particular observational settings, rather than in all settings in which a third person is present. For example, Brody and associates (1987a) noted that few interactions occurred between siblings when their mother was present, a pattern that would make it difficult to assess the characteristics of the sibling relationship. In our own observational work, we have been more successful using a series of triadic tasks than simply observing the sibling dyads alone (Furman, 1992). When they were alone, the children had little else to do except play with their siblings. The triadic tasks also seemed different from those used in other studies. In particular, the children were asked to discuss the things they liked and disliked about their relationship with each other while their mothers were present. Needless to say, this task elicited a significant amount of interaction between the siblings. Perhaps, then, the conclusion that we should draw is that all observations of sibling relationships, even naturalistic ones, are not necessarily useful or even valid indices of the sibling relationship. Investigators using self-report or interview measures typically provide validational evidence for their measures, but observational researchers have often relied on the face validity of their observations. Unfortunately, seeing is not always believing (see Furman, 1992, and Furman et al., 1988, for further discussion).

Finally, and most substantively, the positive features of the relationship may be less influenced by the characteristics of the individuals and more influenced by the history of the relationship. In other words, regardless of the nature of one's personality, one does not necessarily feel close to everyone. Feelings of affection or closeness are likely to be influenced by one's experiences or interactions with that person.

FUTURE DIRECTIONS

Clearly, the literature on personality and sibling relationships is at a very rudimentary stage, yet we believe that the topic has promise. In fact, such work has considerable implications for both personality researchers and relationship researchers. To date, research on the characteristics of individuals and on the characteristics of relationships have developed relatively separately. How the two interface presents some interesting, if thorny, problems. The difficulties arise from the fact that the level of analysis of individuals and that of relationships are fundamentally distinct. One cannot reduce relationships to the characteristics of individuals, nor can one derive the characteristics of individuals solely from their relationships.

How then can the two levels be linked? Elsewhere (Furman, 1984) we proposed six sets of variables that affect patterns of interactions or relationships (see Table 6.2). In this chapter we focused on the first three classes—the characteristics of the individual, the characteristics of the partner, and the interaction characteristics of the two individuals. The fourth category, relationship-specific characteristics, complicates the issues.

Relationship-specific characteristics refer to the history of the relationship, specific attitudes and feelings toward each other, and expectations for the future itself. Because factors such as past history are expected to be major determinants of relationships, relationships cannot be reduced to the characteristics of individuals. The inclusion of situational factors and interactions among the different factors makes such a reduction even less likely.

Unfortunately, relatively little work has examined the role of relationship history or expectations in shaping the subsequent course of a relationship. In part, this omission reflects the fact that relatively few longitudinal studies have been conducted on sibling relationships, or, that relationship researchers have not developed conceptual frameworks or measurement techniques

TABLE 6.2 MAJOR CLASSES OF VARIABLES AFFECTING PATTERNS OF INTERACTION

1. Characteristics of the Individual—skill components, personality, and cognitive characteristics of the person
2. Characteristics of the Partner—skill components, personality, and cognitive characteristics of the other
3. Interaction of the Characteristics of the Two Individuals—product of the first two terms
4. Relationship-Specific Characteristics—history of the relationship, specific attitudes and feelings toward each other, expectancies for the future of the relationship
5. Situational Characteristics—environmental variables that affect social interactions
6. Interactions among Preceding Classes—characteristics of individual by relationship-specific characteristics, characteristics of individual by situational variables, characteristic of partner by relationship-specific characteristics, characteristic of partner by situational variables, relationship-specific characteristics by situational variables, interactions of the characteristics of the two by relationship-specific characteristics, interactions of the two by situational variables, characteristics of the individual by relationship-specific characteristics by situational variables, characteristics of the partner by relationship-specific characteristics by situational variables, interactions of the two by relationship-specific characteristics by situational characteristics.

for examining such variables. An important topic for subsequent research would be to examine such factors and the relative contributions of history and individual characteristics. Given the enduring nature of sibling relationships, history may be particularly important. After all, we probably all remember those incidents when our siblings were particularly nasty or particularly kind.

Studies of the role of personality traits should also provide a better understanding of the inner workings of sibling relationships or other close relationships. During the past decade, considerable progress has been made in developing conceptual frameworks and measures for assessing the characteristics of sibling relationships. Self-report and parental report measures have been developed (Furman & Buhrmester, 1985), and observational schemes exist for coding patterns of interactions in both structured and naturalistic settings (e.g., Brody et al. 1987a; Furman, 1992; Stocker et al., 1989; Vandell et al., 1987). These instruments, however, are measures of relationship or interactional characteristics. An important next step will be to identify the contributions each sibling makes to the relationship or interaction. Measures of children's traits or social behaviors should contribute substantially to that enterprise. Kenny and La Voie's (1984) Social Relations Model may also prove valuable. Using a round robin procedure, each person in a small group, such as a family, is observed interacting with every other person. One can then estimate actor effects (such as traits), partner effects (the extent to which one's behavior is elicited by a particular partner), and relationship effects. One can also estimate the degree to which behaviors are reciprocated. Although the estimates are likely to depend on the dyads that one chooses to observe, such procedures may help us understand the contributions individuals make to their relationships.

Studies of sibling and other close relationships also have some important implications for research on personality traits. To date, most of the work on personality traits and social behavior has examined interactions with strangers or acquaintances, rather than with close others. How might personality traits be manifested in close relationships? On the one hand, one might expect that traits may be more predictive of behavior because the interactions may be less guided by normative rules of interaction, thus more reflective of who the people are (Athay & Darley, 1981). On the other hand, the history of the relationship may be greater, thus reducing the relative influence of the two's traits.

In any event, the manifestations of a trait may be different in the context of a close relationship than in other interpersonal situations. As yet, relatively little consideration has been given to how trait manifestations may be different in close relationships or in particular types of close relationships, such as those with siblings. Perhaps some traits are expressed more commonly in certain relationships. For example, potentially conflictual situations seem to arise more often in sibling relationships than in other relationships (Furman & Buhrmester, 1985); accordingly, one may get a better picture of children's characteristic styles of managing conflict by observing sibling relationships than by observing other relationships in which conflicts are less common.

The preceding considerations give rise to the question of whether people behave consistently in different relationships. The results of the studies described here suggest that there is some moderate level of consistency across relationships. That is, general measures of the five-factor traits or temperament were predictive of the characteristics of sibling relationships. Yet, one can ask if a greater level of consistency or predictive power would be found within specific types of relationships. For example, is there more consistency in one's behavior with two different siblings than there is in behavior between a sibling and a friend? As yet, little relevant evidence exists, although we have found evidence that individuals' views or perceptions of relationships are relatively specific to types of relationships (Furman & Wehner, in press). That is, views of friendships, romantic relationships, and parent–child relationships are only moderately related to one another. If perceptions of relationships are specific to type of relationship, then one might behave somewhat differently in different types of relationships. Such a finding, however, would not necessarily vitiate the significance of traits. Even classical trait theorists did not expect that traits would be predictive of behavior in all situations; instead, they were expected to be predictive in situations in which there was some potential press for such tendencies. For example, some children may generally be dominant in their interactions with others, but the asymmetrical nature of parent–child relationships (and perhaps those with older siblings) may limit the degree to which such a dominant disposition has the opportunity to be expressed. Similarly, even if a child is open or frank, it does not mean he or she will be self-disclosing with every one he or she meets. Certainly, behavior is somewhat dependent on the situation or context, but we have not yet considered how the type or nature of the relationship may be an important contextual determinant. We believe that we will be able to describe better the role of personality in relationships by giving more consideration to relational context.

The study of sibling relationships in particular is intriguing for several reasons. One of the dominant themes in the recent literature has been the idea that siblings experience different environments (Plomin & Daniels, 1987; Rowe & Plomin, 1981). That is, after genetic factors have been accounted for, siblings are on average no more similar to one another than unrelated children. In part, differences may emerge because of differential experiences outside of the family, but differences may also emerge because of differences in relationships with family members. Yet, most traits have a significant genetic component (Loehlin, 1992); thus, one would expect that these factors may contribute to some similarity in experience as well as the similarity in genetic background. That is, each of the children would have the experience of having a sibling with certain personality characteristics. It seems, then, that some factors must counterbalance this tendency to have a sibling with certain characteristics, because siblings have not been found to be more similar to one another than they are to other children (except for genetic factors). A particularly intriguing possibility is the idea that the manifestation of a trait or its construal by the other may vary within the sibling relationship. For example, extroversion in an older sibling may be construed differently than in a younger one. In general, the contribution of structural characteristics of sibling relationships to the expression of traits warrants further consideration.

Clearly, many intriguing questions remain to be answered. The literature on personality traits and other individual characteristics and that on close relationships, particularly sibling relationships, are not well integrated yet, but the study of their interface promises to yield valuable insights for both fields.

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7

DELINQUENCY AND IQ: USING SIBLINGS TO FIND SOURCES OF VARIATION

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In any family, siblings may lead different lives. One child may study hard at school and attain high grades and later a good paying job; another child may fail in school and later find unskilled work. In the Wideman family, John and his younger brother Robby both lived in an urban community and were raised in relative poverty. John, however, won a scholarship to the University of Pennsylvania, where he completed both his undergraduate and graduate studies (he then became a professor of English). In contrast, Robby spent his adolescence stealing to buy drugs; eventually, he was arrested and convicted as an accessory to murder. In his autobiographical book *Brothers and Keepers* (Wideman, 1984), John tried to understand their different life courses. According to John, their mother had always noticed differences between him and Robby, "The bad seed, the good seed. Mommy's been saying for as long as I can remember: That Robby . . . he wakes up in the morning looking for the party . . . Where's it at today? What's it gonna be today? Where's the fun?" (p. 20). Although few siblings have lives as divergent as John and Robby Wideman, they commonly have different developmental outcomes. To analyze behavioral development scientifically, we favor tracing siblings' different life histories.

This chapter describes our general research programs and a number of specific research projects focusing on adolescent development. We investigated various behavioral traits, primarily "deviant" behaviors (e.g., delinquency) and intellectual development. In these research projects, we made considerable use of the sibling research design, namely, sampling more than one child per recruited family. Our interest in siblings is related to theoretical concerns with the etiology of behavioral variation. First, we attribute behavioral variation to particular causal sources that define composite variance components. These variance components are *composite* because a variety of specific influences can unite to produce variation of a particular type, for instance, genes with many different physiological effects may contribute to a trait's heritability. Questions asked about composite variance components include: Is a trait heritable (e.g., Do genes cause variation in the trait?)? Is it influenced by shared family environment (e.g., Do environmental influences cause siblings to be similar?)? Is there a social influence of siblings on each other (e.g., Do specific elements in the social environment influence development?)? Second, we move beyond composite variance components to the way in which they operate on behavioral development—to Anastasi's (1958) question "how?" That is, composite variance components can be seen as opportunities to explore developmental process further if they can be attributed to specific influences and causal pathways.

This chapter is divided into three sections that review our research program and related findings. The first section focuses on using sibling and twin studies to attribute variation in behavior to these composite variance components used in behavior genetic research. The second section discusses the issue of *comorbidity*—traits that are related in their familial co-occurrence. The third section describes specific sources of composite variance components. The chapter closes with a look at unanswered questions and directions for future work. This chapter explores both methodology—what can be done with different kinds of sibling data—and content—what we have learned about the origin of variation in IQ and delinquency.

COMPOSITE VARIANCE COMPONENTS

This chapter describes sibling studies of intelligence (IQ) and delinquent behavior. Human intelligence refers to abstract reasoning and problem-solving abilities as assessed by standardized IQ tests. Intelligence can be regarded as a "fuzzy" concept—no simple definition adequately captures all its facets (e.g., Sternberg & Detterman, 1986). Nonetheless, it is generally agreed that IQ is closely related to success in mastering school-taught academic subjects. The origin of individual differences in IQ has been a perennial research topic in the social sciences.

Delinquent behaviors include acts commonly forbidden by law such as burglary, theft using violence or the threat of force, deliberately injuring another person, and so on. Although specific delinquent acts vary in their legal status across cultures and historical periods, social norms and formal sanctions against them are nearly cross-cultural universals. Levels of delinquency tend to rise from early adolescence into early adulthood (age 25 or less) and then fall sharply later in the life course. Both in the United States and in all societies with extensive records, more males than females are delinquent—especially in those acts that are overtly aggressive. Finally, within each sex, the delinquency distribution is positively skewed across individuals: Most adolescents commit few or no delinquent acts, but a minority are frequently and persistently delinquent.

This latter, individual variation in delinquent behavior is one focus of developmental research. Behavior genetic research designs can apportion behavioral variation to composite variance components. First, they can apportion variation between familial and nonfamilial determinants. Second, trait variation can be further attributed to heredity or shared or nonshared environmental variance components. Heritable trait variation results from genetic effects, that is, from the influence of the substitution of one gene for another relevant to a trait (e.g., the substitution of gene B for A can change blood type AA to blood type AB). Shared environmental influences, by definition, refer to all environmental experiences operating to make siblings alike but different from children in other families; they are environmental influences conceptually tied to the family unit. Finally, nonshared environmental influences operate on each person uniquely; they make reared-together siblings dissimilar in behavior.

Are IQ and Delinquency Familial?

To discover genetic or shared (family) environmental influences, an initial question must be whether a trait "runs" in families. In the case of siblings, the question is: If one sibling exhibits a trait, is it also more likely to appear in another sibling? The simplest way to answer this question is merely to compute either sibling correlations or concordances (e.g., risk to an unselected sibling, given that a selected sibling is affected). In many studies of official delinquency, evidence has been obtained that delinquent behavior is "familial" (Ellis, 1982).

In our research program, we extended this basic sibling research design to examine several siblings who differ in birth order simultaneously (Rodgers & Rowe, 1985; Rowe, Rodgers, & Meseck-Bushey, 1992). If genetic influences—not environmental influences—were primarily responsible for trait variation, then birth order should be relatively unimportant because the recombination of maternal and paternal genes ignores birth order in the production of offsprings' traits. That is, a first-born child's behavioral resemblance to a second-born child should about equal that of his or her resemblance to a third-, forth-, or fifth-born child. However, many social influence factors may influence birth-order adjacent children to be more like one another than birth-order distant children, for example, if parents treat children close in birth order more alike because they are more similar in age. Sibling data never unambiguously separate genetic and family environmental influences, but equal sibling correlations across birth orders would be unexpected in some environmental explanations for behavioral variation.

Table 7.1 presents sibling correlations across four birth orders for both IQ and self-reported delinquency (Rodgers & Rowe, 1985; Rowe, Rodgers, & Meseck-Bushey, 1992). For both developmental outcomes, the sibling correlations are remarkably uniform across birth orders; in particular, more separated children are not less alike in their behavioral traits. The mean correlation for IQ ($r = .57$) was greater than that for self-reported delinquency ($r = .35$), indicating greater shared family influence on the former than on the latter. In both studies, regression

TABLE 7.1 SIBLING CORRELATIONS FOR IQ AND SELF-REPORT DELINQUENCY IN FOUR CHILDREN FAMILIES

IQ Matrix[a]

	Birth Order of Child			
Birth Order	1	2	3	4
1	1.0			
2	.62	1.0		
3	.55	.57	1.0	
4	.58	.57	.55	1.0

Self-Report Delinquency Matrix[b]

Birth Order	1	2	3	4
1	1.0			
2	.19	1.0		
3	.49	.32	1.0	
4	.45	.32	.34	1.0

[a] From "Does Contiguity Breed Similarity? A Within-Family Analysis of Nonshared Sources of IQ Differences between Siblings," by J.L. Rodgers & D.C. Rowe, 1985, *Developmental Psychology, 21*, p. 745. Copyright 1985 by the American Psychological Association. Reprinted with permission.

[b] From "Sibling Delinquency and the Family Environment: Shared and Unshared Influences," by D.C Rowe, J.L. Rodgers, & S. Meseck-Bushey, 1992, *Child Development, 63*, p. 63. Copyright 1992 by the Society For Research In Child Development. Reprinted with permission.

analyses were done to relate sibling similarity to family composition and age-spacing variables. Neither set of regressions suggested that these variables conditioned the siblings' behavioral resemblance. Given the large genetic component underlying IQ variation (Plomin, DeFries, & McClearn, 1990), the IQ results were not surprising. Given also the greater influence of environmental variation on delinquency (DiLalla & Gottesman, 1989), these findings were surprising. Later, we present a different approach showing that siblings' resemblance in self-reported delinquency can be conditioned on other variables.

The sibling correlations yield information about the relative magnitude of familial and nonfamilial influences on trait variation. The square of the mean correlation in Table 7.1 suggests that about 32% of IQ variation and 12% of delinquency variation in one sibling can be predicted from knowing the other's status. This interpretation would be followed in a practical intervention that, for instance, sought to use a low-IQ or highly delinquent sibling as a "risk factor" for younger siblings' behavior.

However, squaring the correlation to estimate the variance is incorrect for another application—estimating the total influence of familial sources of behavioral variation. In this case, the sibling correlation *is* variance explained.

This second interpretation of the sibling correlation is shown in Figure 7.1, in which z is the loading of an observed trait on its common factor of (unmeasured) causes. According to the rules of path analysis (Loehlin, 1987), the sibling correlation in Figure 7.1 equals z^2; that is, it is a product of the path coefficients connecting the siblings' phenotypes. By another path-analytic rule, variance explained in a manifest variable is the square of its loading on the common factor—once again, z^2. Thus, in this model, variance explained in the manifest variable equals the sibling correlation. Of course, this conclusion assumes that z is the same for younger and older siblings. In general, the older and younger siblings would represent, except for age, just two equivalent samples of children. Except for traits strongly associated with age, family effects on each child should be about equal. This assumption is reasonable for both IQ and delinquency in children during middle adolescence.

From the mean delinquency correlation in Table 7.1, one may say that 35% ($r = .35$) of delinquency variation is attributable to common familial influences. These familial effects would be even stronger if adjusted for measurement reliability. This adjustment is merely the sibling correlation divided by the reliability coefficient (r_s/r_{tt}). A reliability of about .75 for delinquency, for instance, would raise the estimated sibling correlation from .35 to .47, indicating that about half of delinquency variation can be attributed to common familial determinants. These common familial influences also may explain the year-to-year stability of delinquency in adolescence. In a path-analytic model, familial influences contributing to sibling resemblance at any one measurement time also contributes to delinquency's *within* person correlation between times of measurement (Rowe & Britt, 1991).

The sibling correlation also yields information relevant to the etiology of sex differences. For IQ, same- and opposite-sex sibling correlations are about equal, indicating that the shared familial influences on female and male IQs are identical. In contrast, in two-child families the self-reported delinquency sibling correlations were .32 in brothers, .27 in sisters, and .15 in boy-girl sibling pairs, a value about half that of the same-sex sibling correlations. To some extent, a lower boy-girl correla-

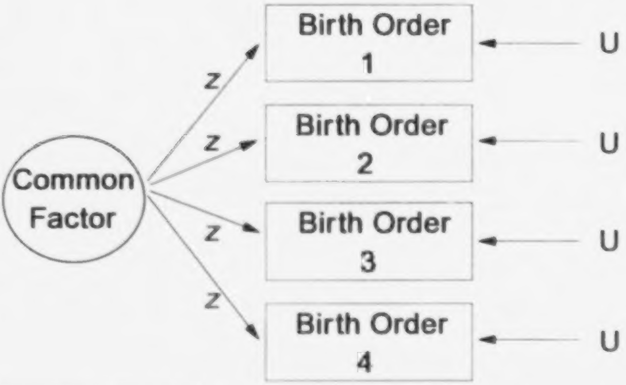

Figure 7.1 Common factor model of siblings' delinquency (factor loading z).

tion could result from statistical artifacts. As mentioned earlier, delinquency has a distribution that is skewed in the two sexes, a property that may reduce the size of correlation coefficients. Nevertheless, another interpretation is that familial determinants of delinquency may be sex-specific; hence, they may fail to contribute as much to boy-girl resemblance as they do to same-sex sibling resemblance. With the correlation coefficients mentioned earlier, about 50% (.15/.30) of the etiological influences would be held commonly by males and females. Other data suggest a figure closer to 70% (Rowe, Rodgers, & Meseck-Bushey, 1992).

Composite Genetic Versus Composite Shared Environmental Variation

To distinguish genetic from family environmental influences, a quasi-experimental design is required that compares pairs of relatives who differ from each other in social and/or biological relatedness. In our work on delinquent behavior, we used the twin study research design (Rowe, 1983). The twins were located through high schools and twin clubs in Ohio. The majority of the twins received their questionnaires along with preaddressed return envelopes. The instructions emphasized the importance of completing the forms independently and, if the twins chose to compare responses, not changing a response because a co-twin had responded differently. The twins' zygosity was diagnosed on the basis of their reports of physical traits (e.g., eye color and height) and appearance similarity. The twins came from a range of social class backgrounds: 20% of their fathers had never completed high school, whereas 27% of the fathers had completed 4 or more years of college. Few twins, however, resided in inner-city areas, and most were Caucasian.

The twin design capitalizes on the greater genetic resemblance of monozygotic (one egg; MZ) twins in comparison to dizygotic (two egg; DZ) twins. If a trait is genetically determined, then reared-together MZ twins should resemble each other in behavior more than reared-together DZ twins. In a study of IQ in 7- to 12-year-old children in the Fels Research Institute's classic study of child development (Rodgers & Rowe, 1987), we used five levels of genetic relatedness: random pairs, cousins, half-siblings, full siblings, and twins. In this case, the rank order of resemblance for a genetically influenced trait should follow the relatives' biological relatedness—from cousins (low) to MZ twins (high).

In this study of IQ variation, we found significant heritability ($h^2 = .39$) and shared family environmental effects ($c^2 = .39$, the same estimate as h^2 to two decimal places) that together accounted for the majority of IQ variation (78%). These results are confirmed from a large body of research on IQ showing statistically significant genetic and family environmental components in IQ variation. Nonetheless, the broad research literature has been interpreted as showing that family environmental influences on IQ may be greater in young children than in adulthood (McGue, Bouchard, Iacono, & Lykken, 1993). From a review of recent twin and adoption studies, McGue and his colleagues (1993) concluded that:

"Heritability [of IQ] increases from approximately 50% in preadolescence to approximately 80% in adulthood. In contrast, shared environmental influences appear to decrease from approximately 20% in preadolescence to near 0% in adulthood" (p. 71).

From the standpoint of psychological science, a diminished etiologic role of family influences on IQ with maturity has been unexpected. This finding can be interpreted as "niche picking" (Scarr & McCartney, 1983), a tendency of people with different genotypes to find environmental contexts that reinforce genetic dispositions. As children mature and are exposed to a greater variety of environmental opportunities, they can pick available "niches" more closely matching their genetic dispositions; hence, genetically different family members (e.g., siblings) become less alike, and IQ heritability rises.

In a study of 265 same-sex adolescent twins' delinquency, statistical evidence for both composite variance components was also found (Rowe, 1983). Table 7.2 shows genetic and environmental parameter estimates from a biometrical genetic analysis of the between- and within-twin pair mean squares (i.e., statistical parts of overall twin correlation coefficients). In male twins, these parameter estimates were $h^2 = .34$ and $c^2 = .32$; in females, they were $h^2 = .41$ and $c^2 = .25$. Although the twin sample size was too small to demonstrate the statistical significance of both variance components simultaneously, the variance estimates suggest that both heredity and family-tied environmental influences produce variation in delinquent behavior.

Although few studies of self-reported delinquency are available, there are a number of legitimate twin studies on delinquency. On the basis of their summary of these studies, DiLalla and Gottesman (1989) concluded that twin concordances for MZ twins' delinquency (*M* = .87) were similar to those for DZ twins (*M* = .72), indicating strong family-tied environmental influences on delinquency (and possibly, biased police response to family members). In contrast, adult criminals showed twin concordances to be more consistent with genetic influence (*M* MZ twins = .51; *M* DZ twins = .22). Overall, greater evidence exists for some kind of shared family influence on delinquency than on many other traits. In summary, neither studies of IQ nor delinquency can neglect genetic influences—for this reason, a family study research design alone cannot resolve composite influences on these traits. Delinquency is a relatively unique trait in that it yields kinship correlations consistent with shared family environmental influences. Finally, some causes of delinquency may be modified by biological sex.

TABLE 7.2 VARIANCE COMPONENT ESTIMATES FOR SELF-REPORT DELINQUENCY

Group	Heritability h^2	Shared Environment c^2	Nonshared Environment e^2
Male Twins	.34	.32	.34
Female Twins	.41	.25	.33
All Twins	.39	.28	.34

Note. Variance percentages from "Biometrical Genetic Models of Self-Reported Delinquent Behavior: A Twin Study," by D.C. Rowe, 1983, *Behavior Genetics, 13,* Table V, p. 485. Copyright 1986 by Plenum Publishing. Adapted with permission. Variance components for log transformed self-report delinquency scores.

VARIANCE COMPONENTS OF TRAIT COVARIATION

Traits do not occur in isolation; their correlated pattern with other traits can help to define them conceptually and unite different levels of analysis; for instance, the covariance of a behavioral trait with a physiological measure may reveal its biological roots. As was the case for univariate analyses, the covariance of traits can be examined at several levels. First, one can evaluate trait co-occurrence in a family pedigree. In psychiatric research studies, the familial co-occurrence of symptoms is called trait *co-morbidity* but the same conceptual analysis can be applied to any set of behavioral traits. Second, as in the univariate case, the covariation of two traits can be attributed to genetic, shared environmental, and nonshared environmental sources of variation. Third, specific measured variables can be included in multivariate, behavior genetic research designs (Neale & Cardon, 1992).

IQ Covariates

Although we did not explore the covariates of IQ in our research program, other behavior geneticists made effective use of multivariate genetic analyses. In one line of research, the covariation of IQ with elementary information-processing tasks was explored. A recent special issue of the journal *Intelligence* published 11 articles documenting correlations between biological measures and intelligence. Several articles focused on reaction time. These reaction-time tasks are "elementary" in that they require simple recognition decisions or timed responses to letters or numbers, all easily made with few errors. Despite their uncomplicated nature, tasks that tap speed of information processing correlate substantially with IQ (e.g., speed of scanning alphanumeric symbols in short-term memory, or speed of comparing physically different or same word pairs; Baker, Vernon, & Ho, 1991). In Baker et al.'s study (1991), the correlation of reaction times with IQs ranged from −.4 to [illegible] (which is so because shorter reaction times are associated with higher IQs). Baker and her colleagues analyzed twin cross-trait correlations, that is, the correlation of reaction time in twin A with IQ in twin B.

Analogous to a univariate correlation, the size of a cross-trait correlation may depend on the twins' genetic relatedness (i.e., MZ or DZ). That is, if the cross-trait correlation in MZ twins is greater than that in DZ twins, genetic influence can be inferred under the usual assumptions of twin method—genetic additivity and equal (trait-relevant) twin environments. From their twin analyses, Baker and her colleagues (1991) concluded that "the speed-IQ association found here is entirely explained by genetic factors. Genetic correlations were negative and at or near unity" (p. 364). This multivariate genetic work thus reveals that underpinning IQ variation may be genetic variation in the capacity to perform such elementary cognitive operations as memory scanning and stimulus recognition. Further progress along these lines could lead to the identification of specific biological processes held in common by IQ and information-processing measures.

Delinquency Covariates

Delinquency theories propose various correlates of possible significance in the etiology of delinquent behavior. Trait-based theories focus on personality differences between delinquents and nondelinquents. For instance, in the widely read social control theory (Gottfredson & Hirschi, 1990), delinquency is attributed to a persistent trait of low self-control established through early socialization in the family during childhood and resistant to change thereafter. Early family socialization also figures prominently in social learning explanations of crime—through a lack of effective punishment for disobedient behavior (Patterson, DeBaryshe, & Ramsey, 1989). Social learning theory also emphasizes the academic milieu, as persistent school failure may lead to a psychological rejection of conventional social norms and an acceptance of antisocial behaviors. Low grades and lack of ambition for advanced schooling are reliable correlates of delinquent behavior.

These different theories of delinquency, however, rarely consider their explanatory variables from the standpoint of composite variance components detailed earlier. For instance, variation in reports of parental behavior may reflect either shared environmental or genetic variance components. Indeed, a shared environmental variance component would be expected on the basis of social learning theories in which parenting behaviors directly influence children's behavioral outcomes. But suppose the parenting practice is one that is reactive to children's traits—that is, parents may show less affection or use more physical punishment when children are temperamentally difficult rather than easy going. Given this reversal of causal direction, heritable traits in children should lead to heritable variation in reports of parental behavior. Indeed, twin and adoption studies generally show a genetic component in the variation of ostensibly environmental measures:

> These [twin and adoption] findings suggest that environmental measures often show as much genetic influence as do measures of such behavior as personality. Even though these are very early days in research on the nature of nurture, the results would so far seem to shift the burden of proof to those who continue to assume that environmental measures are free of genetic influence. (Plomin & Bergeman, 1991, p. 384)

The lesson here is that the composite sources of variation in both predictors (independent variables) and in developmental outcomes must be investigated, not assumed.

Using his Ohio twin sample, Rowe (1986) examined the genetic and environmental architecture of delinquency with a set of five behavioral correlates: deceitfulness, anger, impulsivity, value on academic achievement, and parental rejection. Except for the last correlate, these variables can be conceptualized as enduring personality dispositions. Deceitfulness is lying to others (such as parents or friends) to protect oneself from criticism and from the detection of wrongdoing, impulsivity is acting quickly and without forethought, anger is the expression of this emotion in response to provocation, and value on achievement is the importance placed on obtaining good grades in school and on committing oneself to school activities. The last variable, parental rejection, is the perception of parental love and affection toward oneself.

As shown in Table 7.3, these variables all correlate phenotypically with self-reported delinquent behavior. The two personality traits conceptually linked with delinquency yield the strongest associations (deceitfulness, .50; impulsivity, .32). Perceived parental rejection also was associated with a greater number of self-reported acts (r = .27). Although school failure is often mentioned in theories of delinquency, the value on achievement variable was the weakest predictor (r = .19) for these adolescent twins. At issue is whether the covariance among this entire set of variables is attributable to shared environmental, genetic, or nonshared environmental variation.

TABLE 7.3 PSYCHOSOCIAL VARIABLES CORRELATED WITH 630 ADOLESCENTS REPORTS OF DELINQUENT BEHAVIOR

Variable	r
Deceitfulness	.50
Impulsivity	.32
Anger	.28
Parental Rejection	.27
Value on Academic Achievement	.19

Note. Reprinted from "Genetic and Environmental Components of Antisocial Behavior: A Study of 265 Twin Pairs," by D.C. Rowe, 1986, *Criminology, 24*, Table 2, page 523. Copyright 1986 by American Society of Criminology. Adapted with permission.

To answer this question, a statistical model was imposed on the data that defined permissible sources of variation for each trait. This model defined three common factors. Like common factors in an ordinary factor analysis, these factors can explain variation in each variable as well as their intercorrelations. The common factors represented genetic, shared environmental, or nonshared environmental sources of variation and covariation. For example, if several variables load on the common genetic factor, then their intercorrelation may be attributed to pleiotropic effects of genes—namely, the same genes may determine variation in several phenotypes at once. If they load on a common family environmental factor, then the same specific family environmental influences may determine variation and covariation among the set of variables. Hypothetically, parental rejection could lead the twins to devalue school, break the law, and perceive parental hostility in their reports of parental behavior. A common nonshared factor was also permitted to explain variation and covariation. The specific influences associated with this factor operate simultaneously on all variables, but they also make twins dissimilar from each other in behavior.

In addition to the three common factors, the model postulated variable-specific genetic, shared environmental, and nonshared environmental factors. These variable-specific factors could explain variation in a single variable, without contributing to the correlation of that variable with another. The fit of different statistical models was evaluated by a chi square test—holding for the goals of parsimony (fewest factors) and adequate fit (low chi square).

The best fitting model made one major simplification: Both common and specific shared environmental factors were omitted. Conceptually, many specific sources of environmental variation are naturally associated with the shared environment parameter estimates. To name a few such variables, social class, family religiosity, parental substance use, childrearing styles, family structure (e.g., one vs. two parents), and many other influences studied in social science should operate to make twin siblings alike because of their common experience of the variable's influence. Furthermore, the one family environmental variable actually assessed—perceived parental rejection—did not require a shared environmental factor. Instead, the environmental influence on delinquency and its correlates was primarily nonshared—those influences that operate to make siblings dissimilar to each other in their behavioral traits. These findings emphasize that not all raised-together siblings are equally delinquent; environmental influences must be sought that explain these differences.

Table 7.4 presents the variance contributions of the nonshared environmental factor and genetic common factors. The numbers shown are the proportion of variation in a variable accounted for by the common factor (e.g., 42% of total delinquency variation was attributable to the common factor in males). At least in adolescent males, the nonshared factor explains variation in poor school achievement, delinquency, and perceptions of parental rejection, suggesting common environmental mechanisms inducing the statistical association among them. Possibly, the common influence may be antisocial peer groups befriended by the more antisocial boys. If these boys actively encourage delinquency and poor school achievement, and actively discourage family attachments, then the nonshared factors' contributions to variation may take the pattern of Table 7.4. To the extent that twins have separate peer groups, their peer attachments would operate environmentally as a nonshared influence (and, as discussed later, common friends would have the opposite effect). The pattern of explained variation for a nonshared-environment common factor in females, which emphasizes two temperamental traits, lacks a straightforward interpretation. In another study, work on problem behaviors in late childhood demonstrated that several specific nonshared environmental influences—maternal reading, spanking, and quality of the home environment—were related to twin, sibling, and half-sibling measures of antisocial behavior (Rodgers, Rowe, & Li, 1994).

TABLE 7.4 PROPORTION OF TOTAL TRAIT VARIATION EXPLAINED BY COMMON FACTORS

	Heredity Common Factor		Nonshared Environment Common Factor	
	h_c^2	h_c^2	e_c^2	e_c^2
Delinquency	.42	.32	.24	.05
Deceitfulness	.49	.51	.12	.06
Parental Rejection	.07	.21	.48	.09
Achievement	.06	.09	.47	.00
Anger	.25	.05	.00	.18
Impulsivity	.25	.13	.01	.39

Reprinted from "Genetic and Environmental Components of Antisocial Behavior: A Study of 265 Twin Pairs," by D.C. Rowe, 1986, *Criminology, 24*, Table 5, p. 526. Copyright 1986 by American Society of Criminology. Reprinted with permission.

Turning to the genetic factor in Table 7.4, this factor explained substantial variation in delinquency and deceitfulness. In males, it captured 25% of the variation in both anger and impulsivity. In females, it explained 21% of the variation in parental rejection and 13% of that in impulsivity. However, in both sexes this genetic factor explained little variation in achievement (< .10). Thus, the genetic disposition toward crime appears to reflect more nonintellectual personality traits than academic achievement, which may be more an environmental correlate of delinquency. In summary, covariation in the delinquency domain may be attributed to a combination of genetic and nonshared environmental variation.

Precocious Sexuality and Delinquency

In adolescence, precocious sexual behavior and nonsexual delinquent behaviors are associated statistically. In four studies using data collected from surveys of adolescents, we investigated the familial basis of this association (Rodgers & Rowe, 1988; Rodgers & Rowe, 1990; Rodgers, Rowe, & Harris, 1992; Rowe, Rodgers, Meseck-Bushey, & St. John, 1989). Together, they lead to several general conclusions. First, as in the case of delinquent behavior, precocious sexual behavior is familial; precocious sexuality in an older sibling puts a younger sibling at "risk" (and vice versa). Second, both sexuality and delinquency share some common familial determinants, but they also have

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unique determinants. The common determinants can be inferred from a sibling "cross-correlation": Precocious sexuality in one sibling is associated with greater self-reported delinquency in another, and vice versa. A common "trait" affecting both sexual behavior and delinquency was estimated to correlate .33 and .47 in brothers and sisters, respectively (Rowe, Rodgers, & Meseck-Bushey, 1989, 1992). Third, younger siblings were found to be more sexually active at a given age than older siblings had been (Rodgers & Rowe, 1988).

Rodgers and associates (1992) explored various explanations for this last finding by relating different family structures to the mean level of sexual behavior (e.g., birth orders, birth spacing). For instance, younger sisters of older brothers may be more sexually active than younger sisters of older sisters, because brothers' friends may provide potential sexual partners for younger sisters (a peer "opportunity" hypothesis). Although several such influence hypotheses could be tested using family structure information, none received unequivocal support. One interesting coincidence was noted, however. In a study of adolescents in Richmond, VA and Tallahassee, FL, pubertal maturation was actually more rapid for younger siblings; they self-reported they were more physically advanced than their older brothers or sisters had been at the same chronological age. Earlier maturation could explain sexual precocity in younger siblings; although admittedly, the explanatory problem now digresses because one must understand why pubertal maturation would depend on birth order position. After combining these findings, it makes sense to consider early sexual behavior as part of a general syndrome of adolescent deviant behavior with underlying familial causes.

Specific Sources of Variance Components

The discovery of a composite variance component in trait variation leaves many questions unanswered because many developmental processes would be consistent with the presence of a particular variance component. If the component is "genetic variation," then a difficult challenge is to identify which specific genes are involved. If the component is "shared environment," the problem is to identify which possible mechanism of family environmental influence results in trait variation.

Presently, we know that many specific sources that comprise the composite variance components are unknown for IQ and delinquency. In the case of IQ variation, several nonshared environmental influences can be named that generally lower adult IQ, such as prenatal alcohol exposure and severely premature birth. In the general population, however, these events are relatively rare; they may account for little of the total IQ variation. Recently, we found correlations between several measured indicators of nonshared influence, such as if the mother or caretaker reads to the child, how often the mother takes the child to the museum, the quality of the home environment, or IQ/achievement scores (Rodgers, Rowe, & May, 1994).

Other common, nonshared environmental events that systematically affect IQ are unknown. Similarly, there are hundreds of Mendelian (single gene) disorders in human populations, and many of them affect IQ adversely. But, like fetal alcohol syndrome, they are very rare in most populations; they may account for little of the total IQ variation. Currently, molecular genetic research strategies are being applied to identify specific genes associated with IQ variation in the normal range (IQs 70 to 130; see research methods described in Plomin, 1990). It is too early to gauge the effect of these new research efforts.

Similarly, the specific sources of genetic variation in delinquency have not been identified. One chromosomal abnormality—a double dose of the *Y* chromosome in men (genotype: *XYY*)—has been associated statistically with crime. However, this chromosomal abnormality may be linked indirectly through other phenotypic effects of abnormality, such as lower intelligence (Witkin et al., 1976). Whatever its causal basis, this rare abnormality should account for only a tiny proportion of variation in delinquent or adult criminal behavior. Although molecular genetic methods may be used to scrutinize the composite genetic variation in delinquent behaviors, no large-scale scientific work is being conducted yet, partly because national funding agencies are embroiled in a political controversy over researching a biological basis of crime.

Composite Shared Environment and Delinquency

As mentioned earlier, several studies of delinquent behavior yield composite shared environmental components. In another research project, we examined one hypothesis for the specific source of this composite variation; namely, that it results from peer influence in the family. In nearly all studies of delinquency, delinquent behavior in friends and associates is the best statistical predictor of an adolescent's own delinquency. Causal ambiguity is present here: delinquent youths may befriend one another ("birds of a feather"), or a delinquent youth may influence a nondelinquent one. Most researchers, however, regard the relationship as bidirectional—as partly selection, partly influence (Rowe, Woulbroun, & Gulley, 1993).

In the context of the family, the influential "peer" may be a sibling or friends of the sibling. This reasoning leads to the following prediction: Siblings who have contact with one another, or overlapping friendship networks, should have similar delinquent behavior traits than isolated siblings because of a mutual and reinforcing influence of peers' delinquency on one's own behavior. Siblings' friendships would then operate as a "moderator" variable that influences their resemblance for delinquent acts.

We tested this hypothesis in a study of 418 sibling pairs, all of adjacent birth order (Rowe & Gulley, 1992). The siblings were located in Tucson, AZ through a random-dialing procedure. The final Arizona Sibling Relationship Study sample consisted of siblings forming 141 mixed-sex sibling pairs, 135 brother pairs, and 142 sister pairs (a total of 836 individuals in 418 families). Their mean age was 13.5 years. Most of the families were middle class, as few mothers (3%) had failed to complete high school and many (44%) had a college-level education or better. Interviews were computer administered to each sibling independently. Among other questions asked, each child completed a standard self-report delinquency inventory, a measure of emotional closeness to the other sibling, and an item covering the number of the siblings' common friends. About 20% of the brothers and 13% of the sisters reported frequent contact with common friends; thus, only a minority of adolescent siblings had strongly overlapping friendship networks.

Same-sex siblings' mutual closeness and their friendship networks moderated the sibling resemblance in delinquency. Similar moderating effects did not hold for boy–girl sibling pairs (who generally were more emotionally distant than were same-sex siblings). Table 7.5 presents sibling correlations for two levels of overlapping friendship networks. Brothers with common friends resembled each other more in delinquency than did brothers with separate friends ($r = .20$ vs. .63); similarly, sisters with common friends were more alike than were those without them ($r = .33$ vs. .65). The significant correlations for siblings with little mutual contact (or mutual liking) suggests that peer effects were

TABLE 7.5 DELINQUENCY CORRELATIONS FOR SIBLING PAIRS WITH SEPARATE AND MUTUAL FRIENDS

Group	Brothers *r*	Brothers *N* Pair	Sisters *r*	Sisters *N* Pair
Separate Friends	.20	108	.33	124
Mutual Friends	.66	27	.65	18
All Siblings	.44	135	.37	142

Note. Boy/Girl delinquency correlation was nonsignificant. Adapted from "Sibling Effects on Substance Use and Delinquency," by D.C. Rowe & B.L. Gulley, 1992, *Criminology, 30*, Table 3, p. 227. Copyright 1992 by American Society of Criminology. Reprinted with permission.

not the only source of sibling similarity, a clear alternative was genetic influence via the siblings' resemblance in heritable personality traits (such as impulsivity and anger mentioned earlier). Yet peer influence does add an extra degree of similarity to some pairs, making them markedly alike in their delinquent behavior. Thus a major source of the composite shared environmental influence seen in twin studies may be this peer influence effect (which should be greater for twins than nontwin siblings, given that the former are always the same age). A recent analysis of Danish twins supports this interpretation. A twin contact effect explained part of the variation in delinquency, and estimates of the heritability of delinquency were reduced from those based on the "classic" twin model (Carey, 1992).

Uniting the Threads

This chapter covers a broad spectrum of results from behavior genetic studies of IQ and delinquency, emphasizing work done in our research program. It illustrates some of the methodological possibilities of the sibling research design, such as estimating composite variance components, apportioning covariance to variance components, and seeking specific sources of variance components. In our studies of IQ and in related research, we found that IQ is highly heritable and influenced, beyond childhood, primarily by nonshared environmental influences. Heritable brain functions, as tapped by information-processing tasks, may underlie IQ variation.

In our studies of delinquency, we found that delinquency variation apportioned among all three variance components. Furthermore, the degree of shared environmental influence was exceptionally large. Genetic influence also linked delinquency with temperamental traits (impulsivity); familial influences (either genetic or family environmental) linked it with precocious sexual behavior. Siblings belonging to the same peer network were more alike in delinquent behavior than were siblings who had different friends or who were emotionally distant from each other.

None of these findings, though, constitutes a theory of delinquent behavior. Why did one sibling's delinquency so easily influence that of another? What makes early sexual behavior a familial covariate of delinquency? An imaginative leap, from inductive use of data to deductive theory, is needed to place these findings about delinquency into a broader context.

Moffitt (1993) proposed a theory of delinquency that integrates many of our findings. She believes that adolescent delinquency is actually heterogeneous, composed of a small group of life-course-persistent delinquents who are antisocial at every life stage and a larger group of adolescence-limited delinquents who are basically healthy teenagers mimicking the first group's antisocial behavior. Life-course-persistent delinquents, about 5% of males, exhibit a variety of behavioral problems in childhood. Their childhood traits include lying, hyperactivity, impulsiveness, and aggression. These traits are heritable both in childhood and adulthood; as reported earlier, at least lying (the deceitfulness variable) and impulsivity are *genetic* correlates of delinquency. Because of their personality traits, these children are difficult to socialize; they do not form bonds with others readily and fail in many important life tasks. They embark on an antisocial life course that often continues through adulthood.

Adolescence-limited delinquency exhibits a different set of characteristics, most notably a temporal sequence: Delinquency starts in adolescence and usually ends in the late teens or early 20s. Many males have at least some police contact during adolescence, and most confess in self-report surveys to at least some minor illegal acts. Therefore, the adolescence-limited form of delinquency can be regarded as statistically "normal" in the United States. Furthermore, most adolescence-limited delinquents accept later the normal adult responsibilities of work and parenting. With psychological maturity, they become healthy and productive members of society.

Why do these young people temporarily adopt behaviors that are, at least on the surface, harmful? Moffitt (1993) blamed a temporal gap between physical puberty and adult social and economic responsibilities in Western societies. The onset of biological maturity brings with it an interest in sex and romantic attachment, a wish for independence from family, and a desire to establish rank against other boys (note that these developmental trends are phylogenically shared with other primates). To many adolescent boys, the life-course-persistent delinquent seems to have achieved some of these markers of adult maturity. As Moffitt observed:

> Life-Course-Persistent youths are able to obtain possessions by theft or vice that are otherwise inaccessible to teens who have no independent incomes (cars, clothes, drugs, entry into "adults-only" leisure settings). Life-Course-Persistent boys are more sexually experienced and have already initiated relations with the opposite-sex. [They] . . . appear relatively free of their families of origin; they seem to go their own way, making their own rules. As evidence that they make their own decisions, they take risks and do dangerous things that parents could not possibly endorse. (p. 25)

Average adolescents may be drawn toward mimicking antisocial behavior because it is a means of achieving adult maturity and removing apron strings of childhood dependence. These adolescents, however, possess the social and intellectual traits that would enable them to adopt conventional adult roles. They shift into these roles as opportunities arise (a job or a marriage) and as the costs of delinquency increase (e.g., penalties for crime increase at age 16 or 18 in many states). In contrast, life-course-persistent delinquents possess traits and learning histories that make this transition more difficult; with options foreclosed, they tend to remain antisocial into adulthood (e.g., through crime, abusive parenting, and other forms of antisocial behavior).

The idea that mimicry drives the spread of such behaviors among adolescents is at the heart of our recently developed theory of social contagion (Rodgers & Rowe, 1993). In past work, we borrowed models from epidemiology to explain the spread of smoking (Rowe, Chassin, Presson, Edwards, & Sherman, 1992), drinking (Rowe & Rodgers, 1991), and sexuality (Rodgers & Rowe, 1993; Rowe, Rodgers, & Meseck-Bushey, 1989) through social networks of adolescents. Although these models must be adapted (to accommodate nonbinary behaviors), our social contagion theory can apply to mildly deviant behaviors. Specifically, the life-course-persistent delinquent adolescents "seed" the system and then "spread" delinquency through social contagion. In the language of epidemiological models, normal adolescents will eventually "recover" from such influence. The small group of persistent delinquents remain "infected" with delinquency for life. These ideas of the spread of deviance similar to our previous work on social contagion can be incorporated into mathematical models.

In our findings on siblings' friendships, the mimicry of delinquent behavior is apparent in the sibling effect: When one sibling (or that child's friends) is delinquent, then there is a high likelihood of behavioral imitation. Those siblings who contact one another easily influence one another; those siblings belonging to different peer groups lack this source of behavioral resemblance and consequently may correlate more weakly on delinquency than the high-contact siblings. In this particular sample, the majority of the delinquent siblings were probably of the adolescent-limited type. Nevertheless, some sibling resemblance on delinquency may arise from a presence in the sample of life-course-persistent delinquents, who share predisposing traits via genetic inheritance. In addition, other heritable traits may be shared by siblings who never exhibit delinquent behavior (e.g., extreme shyness, timidity, and depression). These heritable traits would also induce a sibling resemblance.

The within-person correlation between delinquency and precocious sexuality is also understandable in these terms: Physically mature adolescents seek their adult identities through initiating sexual behavior. The life-course-persistent delinquents move in this direction very quickly; their sexuality is precocious.[1] The adolescent-limited delinquents mimic them. The familial covariance between early sexuality and delinquency probably has multiple bases. First, it may be partly a function of siblings' similar rates of pubertal maturation. When both siblings mature late, they would be unlikely to engage in delinquent behavior. Second, it may also arise from those heritable traits related to delinquency and nondelinquency. Third, the social mimicry of delinquent acts also would make siblings alike, at least for those pairs in which the siblings were mutually close.

In the context of socialization research, these conclusions have one anomalous component—blame for antisocial behavior is not placed on parents. In general, there is little evidence of parent-child transmission of behavioral traits; family environment-child developmental outcomes are often mediated genetically (Rowe, 1994). Family heredity molds children's behavioral dispositions, which then express themselves against the constraints of culture and immediate environmental influences.

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[1] Early sexual behavior and childbearing would also maintain genes for the life-course-persistents' pathological traits in the population.

As mentioned earlier, the story of the Wideman brothers gives a nonfictional account of how heredity and environment may interact. Why were John and Robby Wideman's lives so different? As their personalities differed from an early age, their genes for such traits as impulsivity may have differed. They also had different nonshared environmental experiences. The brothers were separated in age by about nine years. Drugs were less available to John in the late 1950s and early 1960s than to Robby in the late 1960s. Robby was exposed to a street drug "culture" that had developed during this decade. Furthermore, Robby's friends were unlike John's, as John observed, "My father called them [Robby's friends] thugs. Robby and his little thugs" (Wideman, 1984, p. 10). Personality traits, immediate nonshared environmental conditions (e.g., drugs, local peer groups), and broader cultural conditions (e.g., social attitudes toward drugs) all differentiated the two brothers. Within this complex interaction of heredity and nonshared environment, we may yet discover why John and Robby Wideman led such different lives—one an outstanding career as a writer and professor of English; the other, a life diminished by crime and imprisonment—and also why siblings in general differ so greatly in behavior.

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8

THE FAMILY CONTEXTS OF CHILDREN'S SIBLING RELATIONSHIPS*

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Children's sibling relationships are complex and multifaceted. Knowledge gleaned from more than a decade of research suggests that, whereas sibling relationships share some unique properties that distinguish them from other interpersonal relationships (Dunn, 1983; Furman & Buhrmester, 1985), experiences with sisters and brothers vary tremendously across children, even across children from the same family. Differences between children's sibling relationships and the ways in which these differences are tied to family circumstances are the issues on which we have focused in our research.

In identifying familial correlates of sibling relationship qualities, previous research has highlighted children's experiences with other family relationships, including their relationships with their parents, their exposure to their parents' marriage, and their reactions to the relationships between their parents and other siblings in the family. A less common but notable line of investigation has focused on children's sibling relationships in contrasting family ecologies: family contexts defined by parents' marital status, the presence of a child with a handicapping condition, or the birth of a sibling (Dunn, 1992).

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With some important exceptions that we consider later in this chapter, the results of this work emphasize the extent of *congruence* across family experiences; harmony or the absence of dysfunction in various dimensions of family life is generally linked to positive sibling relationship qualities. Theoretical frameworks often invoked to explain such patterns of association, including attachment theory and social learning theory, suggest that, in family life and family socialization, all good things are correlated.

From our work we have concluded that sibling relationships and family life are a lot more complicated than is implied by these simple congruence models. One goal of our work, for example, has been to describe the conditions under which congruence between family experiences exists and when it does not (e.g., McHale & Crouter, 1992; McHale, Crouter, McGuire, & Updegraff, 1995). Particularly influential in our thinking about the complexities of family life are Bronfenbrenner's ecological model (e.g., Bronfenbrenner & Crouter, 1983) and Magnusson's interactional perspective (e.g., Magnusson, 1988).

Both the ecological and the interactional frameworks, however, were formulated to account for phenomena of individual development, and thus do not include theoretical statements concerning family relationship processes. In this regard we have borrowed from two related disciplines, family sociology and social psychology. From social exchange theory, for example, come ideas about the importance of partners' relative rewards and costs in their interpersonal relationships (e.g., Huston & Burgess, 1979). Feminist sociological scholarship highlights two themes that pervade our work: First, families are not closed institutions that can be understood in isolation from the broader social structure (an idea consistent with the ecological tradition within developmental psychology); and second, the family is not a "unitary whole . . . (with) a single class position, standard of living, and set of interests" (Ferree, 1990, p. 867), but instead, a diverse set of people, stratified by age and gender, with quite divergent interests, needs, and resources. The latter idea is consistent with the emphasis in recent developmental research on the "nonshared" environment of siblings (Dunn & Plomin, 1990). In the following section we describe how we have applied these ideas in analyzing data from two longitudinal studies: the Penn State Family Relationships Project and the Penn State Study of Children's Everyday Experiences with Siblings.

Interactions as the "Main Effects" in Research on Children's Family Relationships

According to Magnusson (1988), the goal of psychological research should be to "understand and explain why individuals think, feel and act the way they do in real life situations" (pp. 16–17). Key elements of the interactionist framework are the focus on "real-life situations," the characterization of the individual as an active, decision-making organism, and the portrayal of the environment as a source of information for the individual in his or her decision making. Consistent with the organismic tradition, the interactionist perspective emphasizes reciprocity in person–environment influence and the importance of understanding the individual as "an organized whole, functioning as a totality" (p. 22).

One of Magnusson's most important contributions has been to demonstrate the implications of his organismic perspective for research methodology. In his longitudinal studies of individual development, Magnusson employs "pattern analytic" strategies, approaches designed to maintain the integrity or organization of the individual's experiences. He contrasts such "person-oriented" approaches with the more commonly employed "variable-oriented" approaches used by social scientists, wherein the goal is to specify universal relationships between variables. Strategies aimed at determining "how much variance" a set of variables accounts for in "predicting" a particular outcome variable leaves the individual important only insofar as he or she "provides the measures for the variables" (p. 20).

Bronfenbrenner (1979) defined *development* as "a lasting change in the way in which a person perceives and deals with his environment" (p. 3). Implicit in this definition again is the organismic idea of the individual as an active agent in his or her own development (Lerner, 1986). One of Bronfenbrenner's most important contributions has been to delineate the different levels of the environment (e.g., the microsystem, the macrosystem) that persons perceive and with which they deal.

Bronfenbrenner and Crouter (1983) characterized a series of models, varying in complexity, that have been used to study the role of context in individual development. At the simplest (and least informative) level are "social address" models wherein two or more groups of children who differ in some family structure characteristic (e.g., social class, birth order) are compared in terms of psychological outcomes. As Bronfenbrenner and Crouter (1983) pointed out, however, in studies based on a social address model, we learn nothing about "the intervening structures or processes through which the environment might affect the course of development . . . what the environment is like, what people are living there, what they are doing, or how the activities taking place could affect the child" (pp. 361–362).

As an example, much of the research directed at understanding the potential consequences of having a sibling with a mental or physical disability has been carried out within a social address tradition: Groups of children who have siblings with and without disabilities have been identified and compared with respect to psychological well-being or sibling relationship outcomes. Such studies often have concluded that older sisters of children with disabilities are particularly vulnerable to problematic outcomes (e.g., Farber, 1959; Gath, 1974). Given the reliance on a social address model, however, investigators were only able to speculate about the kinds of family processes (e.g., the extra household task or sibling caregiving responsibilities of these girls) that may have been responsible for such effects (McHale & Gamble, 1989).

At the next level of complexity in Bronfenbrenner and Crouter's schema are "process-context" models. Here the researcher explicitly explores the family processes set into motion by the family's "residence" at a particular social address. In such research, differences in well-being of children with disabled and nondisabled siblings are examined, not in terms of whether one has a sibling of a certain "status," but in terms of children's family roles, relationships, and activities. In some of our work, for example, we examined phenomena such as children's household tasks, sibling caregiving, and differential treatment in families that include children with and without disabilities and also studied the ways in which these *family experiences* are linked to children's well-being and sibling relationship evaluations (McHale & Harris, 1992).

According to Bronfenbrenner and Crouter (1983), the most complex, "person-process-context" model allows the researcher to test explicitly the idea that the same family processes may have different implications for children with different characteristics who are growing up in different family contexts. The idea that objectively similar events can have markedly different implications makes sense when individuals are seen as actively interpreting their experiences. Thus, for example, when siblings have special needs and children are cognitively sophisticated enough to recognize the legitimacy of parents' differential treatment, "preferential" treatment of a sibling may not have its expected negative ramifications (McHale & Pawletko, 1992).

Despite their somewhat different emphases, Bronfenbrenner's model of human ecology and Magnusson's framework for studying individual development share a concern with moving beyond the delineation of universal or "normative" patterns to focus on differences between individuals or groups of individuals in the processes underlying development. Within both Magnusson's and Bronfenbrenner's perspectives, the study of individual differences departs from the typical variable-oriented goals of fitting models or specifying "variance accounted for." Instead, describing differences in patterns of experiences becomes the researcher's goal. In our research we attempted to apply these ideas, generated in the study of individual development, to the study of sibling and family relationships. In the study of siblings these perspectives direct our attention to examining the ways in which children's personal characteristics and the characteristics of their family contexts moderate the effects of family processes in shaping sibling relationship experiences and their psychological consequences.

In the following section we target several themes emanating from the two perspectives outlined earlier and show how we applied them in our work on sibling relationships. Specifically, we consider the issue of sibling activities as important relationship phenomena, review our work on contextual differences in children's sibling experiences, and describe the ways in which we have tried to understand patterns in children's sibling and family relationships. First, however, we provide a brief overview of the two longitudinal studies that are the basis of our work.

Studying Sibling Relationship Patterns in Context

As noted, in both the Penn State Family Relationships Project (Crouter & McHale, 1993; McHale & Crouter, 1992) and the Penn State Study of Children's Everyday Experiences with Siblings (McHale & Gamble, 1989), we applied ecological and interactional ideas about development to the study of family functioning. The latter study focused on a sample of approximately 60 families of school-age children, half of which included a younger sibling with mental retardation and the other half only nondisabled siblings. In contrast, the Family Relationships Project examined the experiences of about 150 firstborn school-age children with younger siblings, who were growing up in two different contexts defined by their parents' work situations—dual-earner and single-earner households. The families in both these studies were drawn from the small towns, cities, and rural areas of central Pennsylvania. Reflecting the demographic characteristics of this region, they were predominately white and working or middle class. (For more details about sample characteristics, see McHale, Crouter, & Bartko, 1992; McHale & Gamble, 1989.)

Despite their emphasis on quite different applied themes (i.e., the challenges of rearing a disabled child; parental employment patterns), these studies shared several important features. First was their focus on children in middle childhood. Paralleling the more general developmental literature, not much is known about sibling relationships during this developmental period. The increasing autonomy of children in middle childhood, however, means that children begin to play a more active role in deciding what they do with their time and with whom they spend their time. We were interested in the extent to which siblings represented an important source of companionship for children in middle childhood. In both studies the older siblings' average age was approximately 11 years and the younger siblings averaged about 8 years of age.

A second commonality across these two studies was that both focused on children with younger siblings. Because a larger goal of our work was to understand children's family roles and responsibilities as a function of family context, we chose to study children who might serve as caregivers for younger brothers and sisters or have other special demands placed on them because of their family circumstances.

These two studies also shared a concern with analyzing contextual differences in children's family experiences. As noted, one study involved comparisons between children with and without siblings who had disabilities; the second focused on children growing up in single-earner (father employed) versus dual-earner (both parents employed) families. From the perspective of children's sibling experiences, family contexts involving dual-earner parents or siblings with disabilities may be particularly interesting insofar as the demands of these contexts pose special challenges and place extra demands on older sisters and brothers (e.g., for sibling caregiving, household tasks).

Finally, both of these studies also involved two kinds of data collection. First, at each point of data collection we conducted home interviews in which family members described their subjective evaluations of their family relationships and personal well-being. In the study of children with disabled siblings, mothers and older siblings were interviewed. In the study in which we examined parental employment patterns, mothers, fathers, firstborns, and secondborn siblings were interviewed. The second data collection procedure involved a series of nightly telephone interviews in which children and parents reported on their daily activities, including household tasks, caregiving, and leisure. A question we raised in some of our work pertains to the links between these more objective accounts of family life and family members' subjective descriptions collected in the home interviews (see McHale & Crouter, 1992; McHale, Bartko, Crouter, & Perry-Jenkins, 1990).

During the telephone interviews family members reported the frequency and duration of their activities (e.g., making the bed, running errands, playing video games, or going swimming) as well as their companions in their activities (e.g., mother, father, sibling, friend). At each phase of data collection, phone interviews were conducted on seven evenings shortly before the children went to bed. Thus, our portrait of children's daily lives includes information about both weekdays and weekend days. In one of these studies, the design also involved data collection during the school year and during the summer months, enabling us to examine seasonal changes in parents' and children's activity patterns (Crouter & McHale, 1993). Using such data we began to construct a picture of family life across "social time" (Sorokin & Merton, 1937). A pragmatic advantage to this procedure is that data collection at the "event" level allows the researcher to aggregate information about children's activities in a variety of different ways to answer different (and often unanticipated) kinds of research questions.

Analysis of Children's Daily Activities with Siblings

Both Magnusson and Bronfenbrenner stressed the importance of studying human development as it unfolds in the natural environment. Given its emphasis on naturalistic observations of social interactions in the home, much of the research on children's sibling relationships is compatible with ecological and interactionist themes (e.g., Brody, Stoneman, & Burke, 1987; Bryant & Crockenberg, 1980; Dunn, 1988a). Such studies provided important information about issues such as the extent of hostility and affection in siblings' social exchanges and mothers' roles in sibling relationship processes.

It was a pilot observation of one sibling dyad, however, that led to the first author's interest in examining siblings' everyday experiences at a more molar level. This observation took place in the home of a girl approximately 9 years of age. Her brother, about two years younger, was severely mentally retarded and blind. In introducing our study we told the family that we were interested in how sisters and brothers played together. Over the course of an hour we watched as our target child, sitting on the floor of the living room and keeping up an encouraging stream of chatter, rolled a ball to her brother who then rolled it back. At the end of this hour of "cooperative play," the child waved a cheerful goodbye and dashed out to the yard to play with her waiting friends. Later, as she walked us to the door, the children's mother gave us a sheepish apology for what she perceived to be her children's poor "performance." "You see," this mother explained, "they never play together." It did not take much insight for us to realize that, although this particular observation showed us how two siblings could behave when they were together, the more important issue was whether the children actually spent time together in their everyday lives.

On a conceptual level, our focus on children's daily activities is grounded in an ecological tradition. As Bronfenbrenner (1979) noted, children's daily activities are developmental phenomena that are worthy of examination in their own right. Yet, in the extant literature, "there [has been] no attempt to examine molar activity from a developmental perspective, to view its complexity and content as reflecting the level of the person's psychological growth" (p. 49). To this we would add that joint activity patterns also reflect the complexity and distinctiveness of children's family relationship experiences (Herbst, 1953).

Although we piloted other strategies for collecting activity data (such as asking children to keep diaries or asking them to provide a narrative account of their day over the phone), we were most satisfied with the structured telephone procedure. This "cued-recall" technique allowed us to obtain a reliable yet richly detailed portrait of children's daily lives, including their activities with their siblings. This approach has the advantage of providing information about activities that are relatively low in frequency (such as a child babysitting for a sibling or two siblings setting the table together), activities that occur outside the home (e.g., siblings going to the movies or playing together at a neighbor's house), and activities that vary in terms of "social time" (e.g., weekdays versus weekend days; school year versus summer vacation).

Analyses of reports from 150 children who participated in the Family Relationships Project underscore the importance of siblings in the lives of school-aged children. Others have noted that the sibling relationship is often the most enduring interpersonal relationship, spanning the time from childhood through old age. Our findings show that, at least in childhood, sibling relationship experiences also take up more of children's time than any other interpersonal relationship context. As Figure 8.1 illustrates, the 11-year-olds in our sample reported spending about 33% of their out-of-school hours (on average, approximately three hours a day) in the company of their siblings.

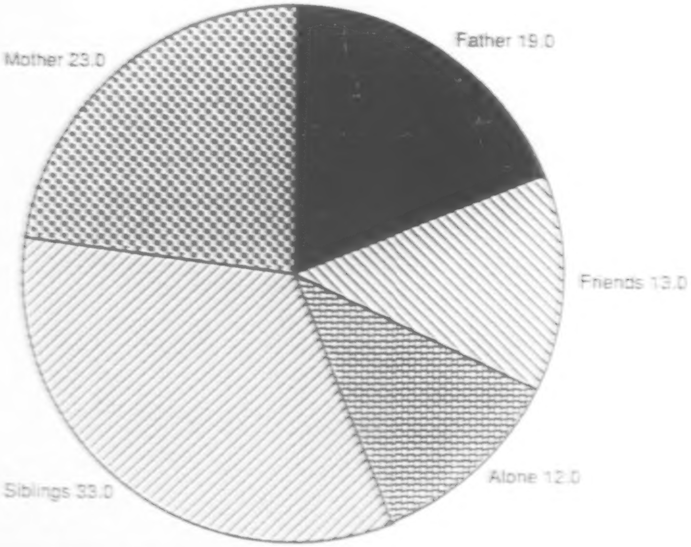

Figure 8.1 Children's companions in their daily activities.

To foreshadow our next topic, contextual differences in children's sibling experiences, we direct the reader's attention to Figures 8.2 and 8.3. These data show that "normative" statements obscure interesting and potentially important differences in children's sibling activities, differences that emerge at different times and in different settings. First, in our research comparing children with and without siblings with mental retardation, we found that, although both groups of children spent similar amounts of time overall with their younger siblings, the two groups of siblings were quite different in terms of what they did with their time together. Children whose siblings had disabilities spent a greater proportion of their time in sibling caregiving activities, and it was the extent of caregiving, not the amount of time siblings spent together, that was related to poorer well-being in these youngsters (McHale & Gamble, 1989).

Our research on children from dual- versus single-earner families included the additional complexity of a temporal dimension. Using data from this study we were able to compare the sibling activities of children from dual- and single-earner families during the school year and during summer vacation (Crouter & McHale, 1993). Analyses revealed that, in contrast to other children, dual-earner girls tended to become more involved in sibling caregiving during the summer months. That is, contextual differences in children's sibling experiences only became apparent when the constraints imposed by school hours were lifted, and those context differences emerged only for firstborn girls (see Figure 8.3). This pattern of changes in the sibling caregiving activities of girls from dual-earner families is an example of what Bronfenbrenner and Crouter (1983) termed a person X process X context interaction and is illustrative of the "gendered" nature of children's family roles (Ferree, 1990). We turn now to a consideration of the potential implications of such interaction effects in children's sibling experiences.

Contextual Differences in Children's Sibling Experiences

As we noted earlier, a second theme in our work is family context similarities and differences in children's sibling experiences. Our interest in children's family roles and activities led us to choose alternative contexts wherein children might experience extra demands and responsibilities (e.g., sibling caregiving, household tasks). Studying the sibling relationships and

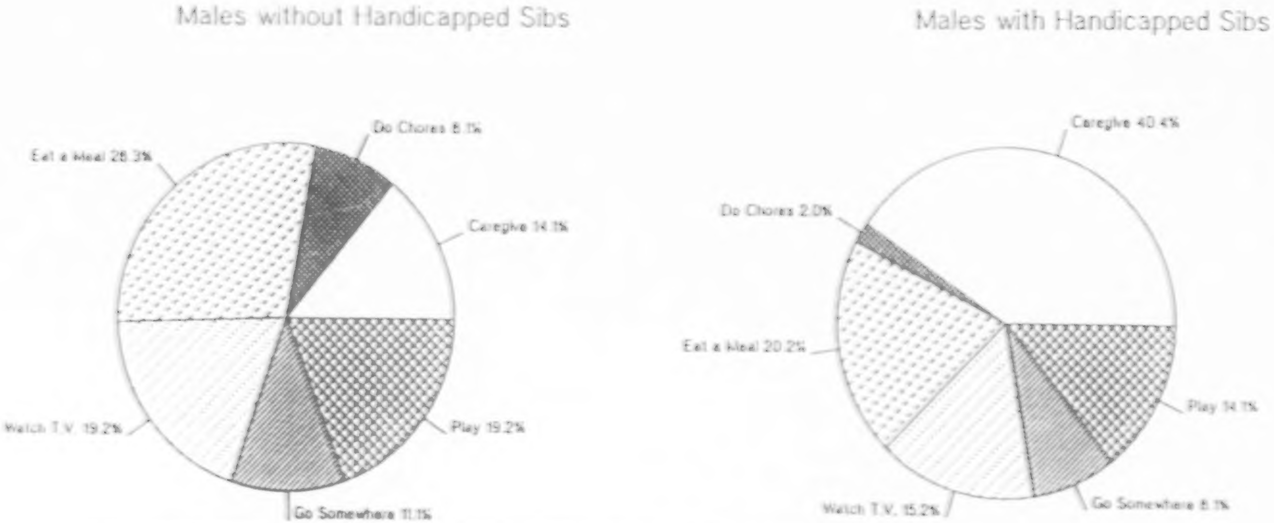

FIGURE 8.2 The nature of boys' activities with younger disabled and nondisabled siblings.

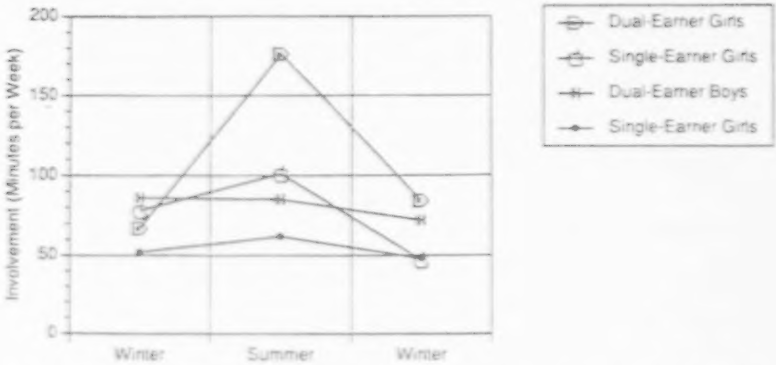

FIGURE 8.3 Seasonal differences in the sibling activities of girls and boys from dual- and single-earner families.

experiences of children in alternative family contexts, contexts defined by different demands and opportunities, provides for what Bronfenbrenner (1979) termed a "natural" or "ecological" experiment in which the investigator can highlight certain family dynamics that might be otherwise overlooked.

In addition, studying children's sibling experiences in context highlights the complexities underlying the links between sibling relationships and other family experiences. In most sibling research, investigators have been interested in universal patterns linking these relationships with other family dynamics. The assumption underlying such a view has been that family processes such as maternal warmth or differential treatment operate in the same way despite differences in children's personal characteristics or the demands of the family context. In contrast, the alternative, ecological model emphasizes the likelihood that the same family processes may have quite different implications for children with different personal characteristics who are growing up in different family contexts (Bronfenbrenner & Crouter, 1983).

Consistent with the ecological approach is the notion that, although a congruence model may provide the best description of the connections among family relationships in nonclinical samples of families, a compensation model may best describe the dynamics of "dysfunctional" families (Bank & Kahn, 1982; Boer, 1990; Dunn, 1992). Thus, hostility from parents and extreme marital discord may provide the foundation for especially close and supportive sibling relationships in some families.

We uncovered evidence of other such "process X context" interactions in our research on maternal differential treatment in families with disabled and nondisabled children (McHale & Pawletko, 1992). In this study we examined several dimensions of maternal differential treatment, including the time mothers spent in a variety of activities with their children, each child's involvement in household tasks, and mothers' discipline directed toward each child. Evidence of process X context effects was the finding that more frequent discipline of an older (nondisabled) sibling was associated with that child's more positive ratings of the sibling relationship in families with children with mental retardation; in contrast, in families that included only children without handicapping conditions, more frequent discipline toward an older sibling was associated with that child's more negative ratings of the sibling relationship. Given similarity in the absolute levels of discipline, these findings imply that what is, in an objective sense, the "same" family process has different implications for children from these different family contexts.

Both Bronfenbrenner and Magnusson cited the work of Lewin (1946) in discussing the importance of the "psychological field" or the "psychological meaning" of an experience or situation and its implications for the individual. Thus, children, even children from the same family, may attribute different meanings to the same family dynamics. In fact, analyses of the implications of differential treatment for two children from the same family highlight the importance of "point of view," an issue to which we return later in this chapter.

In the case of children with disabled siblings, we argued that perceptions of the legitimacy of parents' differential treatment may color children's reactions to this family dynamic (McHale & Harris, 1992; McHale & Pawletko, 1992). In families with nondisabled school-age children, a firstborn who receives more discipline may see herself (and be seen by others) as the "problem child." Receiving more discipline than a younger sibling with mental retardation who is not responsible for his or her own behavior, however, may not yield the same attributions.

These ideas are consistent with social exchange principles. For example, from the perspective of social exchange theory, what is "fair" is *the* central theme in individuals' evaluations of their interpersonal relationships: Ideas about equity in relationships imply that individuals evaluate their own "rewards" and "costs" in their relationship experiences, and "when individuals find themselves participating in inequitable relationships they will become distressed" (Hatfield, Utne, & Traupman, 1979, p.

101). A basic assumption implicit in these ideas and central in our work is that individuals within a relationship often will evaluate their experiences quite differently. This is because the balance between one's own rewards and costs and those of a relationship partner is delicate and difficult to maintain.

In addition to studying sibling relationships in different family contexts, a second ecological proposition emphasizes *sibling experiences as a context*, a context that may set into motion other family dynamics. Second-order effects refer to "the indirect influence of third parties on the interaction between members of a dyad" (Bronfenbrenner, 1979, p. 68). The extant literature includes many examples of second-order effects of parents' behavior (e.g., maternal warmth in the parent–child relationship, parents' treatment of the sibling, the quality of the marriage relationship) on sibling relationship dynamics (Boer, 1990; Brody, Stoneman, & Burke 1987; Dunn, 1988b; MacKinnon, 1989; Teti & Ablard, 1989).

Studies of how siblings generate second-order effects on children's other family experiences are rarer. One example is research on young children's family experiences following the birth of a sibling. This work shows how a new brother or sister can affect a child's relationship with other family members (e.g., Stewart, Mobley, Van Tuyl, & Salvador, 1987). Further analysis of how the presence of a sibling may affect the family experiences of other children (i.e., how siblings exert second order influences) seems especially important given the recent surge of interest in the "nonshared" environment of siblings. That is, because siblings may be as different from one another as unrelated children, determining how and why the family environment is experienced differently by siblings is an important research goal (Dunn & Plomin, 1990). The "same" family environment may have differential effects because children perceive objectively similar dynamics in different ways, because the same dynamics have different effects on siblings with different personal characteristics (e.g., boys versus girls or children with easy versus more difficult temperaments), or because siblings themselves treat one another in different ways.

Second-order effects also may play a role. Our work on children's experiences with their fathers provides an example of such second-order sibling effects. Previous studies have examined father-child relationship properties as a function of the sex of the child. The results of this work suggest a preference on the part of fathers for involvement in activities with sons (Hoffman, 1977;

Parke & Tinsley, 1987). Examining paternal involvement as a function of the sex composition of the sibling *dyad*, however, reveals that knowledge of only a target child's sex provides incomplete information about this family dynamic. Figure 8.4 portrays children's reports of their dyadic activities with their fathers based on nightly telephone interview reports. The children who provided these data included 103 firstborns from the Family Relationships Project (average age 11 years) whose secondborn siblings were at least six years of age (see Stocker & McHale, 1992). These data illustrate the way in which the presence of a same or opposite-sex sibling can alter the dynamics of father–child relationships. They suggest that, during the school-age years, a father's "preference" for boys is operationalized only when he has a son and daughter between which to choose. Girls may be particularly "disadvantaged" in terms of spending time with their fathers when they have older brothers. In contrast, the firstborn girls in this sample who did not have brothers did not differ significantly from either boys with or boys without brothers in the amount of time they and their fathers spent together.

On a theoretical level, although developmentalists have made headway in studying sex differences in children's family experiences, feminist sociological theory alerts us to the potential significance of *gender role differences*, for example, between daughters versus sons or sisters versus brothers (Ferree, 1990). Because gender roles are not assigned simply on the basis of

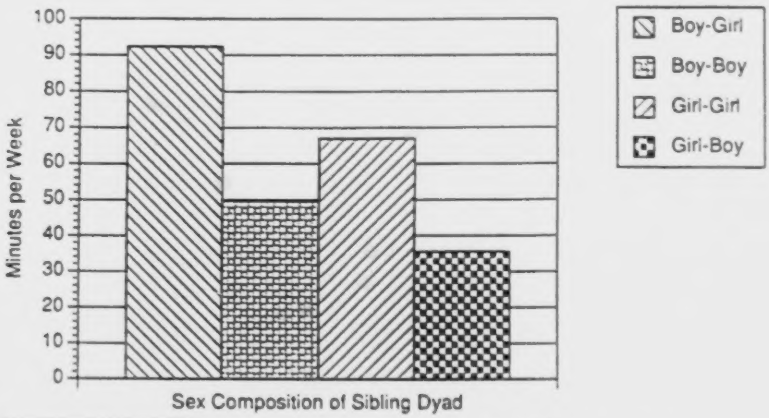

FIGURE 8.4 Differences in father–child dyadic involvement as a function of the sex composition of the sibling dyad.

sex, but constructed in social experience, a boy may take on elements of the sister role (e.g., in sibling caregiving) or a girl elements of the son role (e.g., engaging in sports activities with her father) if a child of the "appropriate" sex is unavailable. This perspective directs our attention to the larger family context of dyadic relationship processes.

The gender-role experiences that arise from second-order sibling effects may have important implications for children's individual development (Huston, 1983). Analyses of data from the Family Relationships Project, for example, revealed differences in girls' math achievement that are tied to patterns of paternal involvement: Girls with relatively uninvolved fathers showed declines in math achievement from the 5th to the 7th grade, declines not apparent in the performance of girls with more highly involved fathers (Updegraff, McHale, & Crouter, in press). Again, such processes in girls' family experiences appear to be set into motion, at least in part by the presence or absence of brothers. In additional analyses of "gender intensification" processes (Hill & Lynch, 1983), we showed that increasing traditionality in some aspects of children's family roles in early adolescence is exacerbated by the presence of a younger sibling of the opposite sex (Crouter, Manke, & McHale, 1995).

In sum, moving beyond "universalistic" or normative ideas about sibling relationships to studying these relationships in context represents a potentially fruitful line of inquiry for this field. In our work, we focused on two propositions emanating from an ecological tradition: the ways in which the larger family environment may mediate or moderate sibling relationship processes, and the role of second-order effects of sibling experiences on dynamics within the family. We turn now to a consideration of a final issue, implicit in ecological ideas and explicated by Magnusson (1988) within his interactionist perspective: the study of *patterns* in children's sibling and family experiences.

Identifying Patterns in Children's Sibling and Family Experiences

As we noted at the outset of this chapter, a goal of our work has been to understand between-family differences in patterns of experiences within families. Our focus on patterns is grounded in a concern with treating families and family relationships as units of analysis; in so doing, the organization or integrity of family members' experiences is highlighted.

We have several reasons for adopting a pattern analytic approach in the study of children's sibling and family relationships. First, although experimental designs allow for random assignment to groups representing all possible combinations of the independent variables of interest, field researchers who study sibling relationships in the naturalistic environment of the family cannot assume that person, process, and contextual characteristics are independent. Rather, there typically exist "natural confounds" among the constructs in which researchers are interested. Using an example outlined earlier, we expect that sibling sex constellation and father–child relationship properties are not randomly distributed across families. Thus, questions about how much variance sibling gender independently contributes to a measure of sibling relationship quality or child outcome miss the point that, in the real world, sibling gender co-occurs with other family qualities. From this perspective, a logical first step in field research on families is the identification of groups of individuals or families who share a similar pattern of characteristics. Following the identification of theoretically interesting family "types" that vary along several dimensions of family processes and characteristics, differences in relationship or individual "outcomes" can then be explored.

A second advantage of a pattern-analytic approach is that this conceptual framework gives rise to alternative research questions about sibling relationship experiences. Our research on the family correlates of mothers' and fathers' differential treatment provides an example of a pattern-analytic approach "in action" (McHale et al., 1993). Several previous studies of differential treatment have included data about both mothers' and fathers' behavior (Brody, Stoneman, & McCoy, 1992a, 1992b; Volling & Belsky, 1992). The conceptual underpinnings of their work led these researchers to treat the two parents' behavior independently and to ask "normative" questions about whether the correlates of maternal and paternal differential treatment differ and whether paternal differential treatment better accounts for differences in sibling relationship properties than maternal behavior.

In contrast, our conceptual framework led us to frame our question about mothers' and fathers' behavior in terms of differences between families in parental patterns of differential treatment. Using data from the Family Relationships Project, we began by identifying groups of families that differed in patterns defined by mothers' and fathers' behavior. Of theoretical interest were: (a) a *complementary* pattern of differential treatment (in which mothers favored one child and fathers favored the other); (b) a *congruent* pattern (in which both parents favored the same child or both displayed equal treatment); and (c) an *incongruent* pattern (one parent displayed preferential and the other equal treatment). Given the notion from the literature that equal treatment is the optimal parenting strategy, we began our study with the idea that the negative implications of one parent's "favoritism" toward a child might be offset if the other parent favored the sibling (i.e., that differential treatment might be experienced by siblings at the level of the parental dyad).

Our findings revealed, however, that a complementary pattern of parental differential treatment was rare. Instead, parents were likely either to exhibit similar patterns of "favoritism" or to display a pattern in which one parent exhibited differential and the other equal treatment (the incongruent pattern). Our analyses revealed, further, that these parental patterns were linked to sibling, marital, and parent–child relationship properties as well as to children's individual well-being. With respect to our interest in patterns, an important finding was that incongruence in parental warmth (i.e., one parent reporting equal treatment and the other preferential treatment) was associated with more negative ratings of the marital relationship by parents. Such a finding is consistent with the hypothesis that differential treatment of siblings may reflect a parent–child coalition that arises in distressed marriages (Reiss et al., 1993). Exploring this hypothesis, however, required a conceptual and methodological approach wherein the organization or integrity of family experiences was maintained.

Patterns also are important at the dependent variable end of the equation. Analyzing patterns in siblings' well-being and family relationship outcomes gives rise to alternative models of individual and family functioning. At the outset of this chapter we noted that much existing literature promotes a model of congruence in family experiences. The family portrait that emerges is simple and straightforward: Parents with good marriages exhibit better parenting styles, giving rise to more positive sibling relationships and more adaptive child well-being. This model may make sense when one examines outcomes one at a time. Examining *patterns* in family members' well-being or in individual functioning across several domains, however, suggests a more complicated state of affairs. In a nutshell, optimization in one arena of individual or family functioning may come at the expense of accomplishments in another.

As we suggested, applying these ideas at the level of the family involves examining *patterns or profiles across family members' experiences*. In our work on parents' differential treatment, for example, we compared two siblings' reactions to the same pattern of parental treatment. Examining patterns across two siblings' outcomes suggests that parents' favoritism toward one sibling may enhance that child's self esteem or parent-child relationship evaluations—at the expense of those of the brother or sister (McHale et al., 1993). These findings are consistent with results of other analyses of sibling differences in adjustment (e.g., Daniels, Dunn, Furstenberg, & Plomin, 1985). They are also in accord with the principle from social exchange and feminist sociological theories that individuals in a relationship often have competing interests (Ferree, 1990; Huston & Burgess, 1979).

These ideas also can be brought to the level of the individual, highlighting an alternative model of individual adaptation. For example, results from both of our studies described here suggest that children who experience preferential parental treatment may report a less harmonious sibling relationship, but profit in terms of their individual well-being (McHale & Pawletko, 1992; McHale et al., 1993). Similarly, research by Dunn and Kendrick (1981) suggests that girls who have closer, more playful, and intense relationships with their mothers may actually have a more difficult time adjusting to the birth of a sibling. Finally, we argued that the slightly higher levels of anxiety reported by children in some challenging family circumstances may be the price of a more mature sense of self and a more sophisticated understanding of the world (McHale & Gamble, 1989).

In short, analyzing patterns highlights the choices and tradeoffs made by individuals and families in balancing different and often competing interests and needs. At the level of the individual, "development is never only a gain" (Baltes & Baltes, 1990, p. 16); rather, accomplishments in one domain are pursued at the expense of skills in another, and personal achievements may come at the price of interpersonal relationships. At the level of the family, promoting the needs and interests of one member may give rise to differences in individuals within the family: differences between brothers and sisters, husbands and wives, or parents and children in their emotional well-being, personal achievement, and evaluations of family life. Conceptual and analytical approaches that ignore these patterns paint a deceptively simple portrait of individual and family functioning.

CONCLUSIONS

The task of understanding sibling relationships is necessarily complex. It involves (at minimum) analyzing relationships that: (a) include multiple dimensions (e.g., warmth, conflict, involvement), (b) are experienced by two children in potentially different ways, (c) are tied to diverse elements of family dynamics, (d) operate differently in different family contexts, and (e) change continually as children mature.

Much of the existing research on sibling relationships is grounded in a traditional developmental framework. From developmental psychology come important ideas about how age-related qualities of children (such as their social cognitive or emotional development) may be connected to sibling experiences as well as ideas about changes over time in relationship properties. In contrast, social psychological notions about interpersonal processes, including interpersonal perception and social exchange, direct our attention to the sibling dyad as the unit of analysis. Furthermore, ecological and sociological perspectives alert us to the ways in which outside forces can penetrate the family and alter the nature and meaning of sibling experiences. In this chapter we tried to show how ideas from several disciplines can be brought to bear on the study of siblings. We believe that adopting a multidisciplinary approach can provide new insights to investigators engaged in the complicated task of understanding sibling relationships.

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9

NEGATIVE SIBLING INTERACTION PATTERNS AS PREDICTORS OF LATER ADJUSTMENT PROBLEMS IN ADOLESCENT AND YOUNG ADULT MALES*

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It is well known that sibling outcomes with antisocial behavior and delinquency are highly intercorrelated (e.g., Patterson, 1984; West & Farrington, 1973). The actual mechanism through which sibling interactions may contribute to later behavior is of substantial interest to us, but is as yet unclear. As viewed by social interactionists, the exchanges between siblings and an aggressive child in the family are prime determinants for future antisocial behavior (Patterson, 1984, 1986b). From this viewpoint, the aggressive child and the siblings share a similar environment, and their reactions to each other may determine pathological outcomes. It is also our position that in those families in which children develop antisocial behavior patterns, the home environment with unskilled parents may become so homogeneous that all family members are altered to become increasingly similar in their use of coercive behaviors with each other.

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Similarities in siblings' behavior have been found both by observational measures and ratings by others. Patterson (1984) pointed out that the observed rates of siblings' coercive behavior at home by definition must correlate in that, in large part, they reflect the coercive reaction of one child to another; in effect, the two numbers define a kind of dyadic trait. High-magnitude correlations among siblings were also obtained in a recent study of elementary school-age children (Lewin, Hops, Davis, & Dishion, 1993). When peer ratings of negative behaviors were the criterion, the correlation between same-sex siblings was .65. The magnitude of this correlation is considerably larger than the range of .20 to .38 found in the large-scale survey by Sells and Roff (1967) for ratings of degree of acceptance.

For teachers' ratings of likability, the sibling–sibling correlation was $r = .55$, and correlations of similar magnitude were obtained for observational data describing prosocial behaviors occurring in the classroom and on the playground (Lewin et al., 1993). In addition, delinquency rates covary significantly among siblings such that a small number of families account for the bulk of delinquent behavior in any given community. For example, West and Farrington (1973) found that for a base rate of delinquency of .20 for an inner-city sample, the likelihood of a recorded law violation for a boy with a delinquent older sibling was .67; for a boy with a delinquent younger sibling, it was .69. Similarly, researchers observing the interactions of young siblings have found high orders of reciprocity in sibling pairs. Lamb (1978), for example, found that prosocial acts (e.g., smiling and approaching) and the less social act of taking the sibling's toy correlated about $r = .67$ for siblings. Abramovitch, Corter, and Lando (1979) also found high rates of mutuality among young siblings: Older siblings usually initiated aggressive and prosocial interactions, whereas younger siblings typically reciprocated in kind. These results were replicated in a longitudinal study in which the rates of reciprocally aversive behavior by younger siblings steadily increased as they were followed from age 18 months to age 5 years (Abramovitch, Corter, Pepler, & Stanhope, 1986).

The issue of magnitude of similarity among siblings is important because of its contribution to the ongoing debate about the level of shared environment in the socialization of children from the same families. Several studies have suggested that shared environmental effects on children's behavior are of very low magnitude, the majority of variance being explained by genetic and unshared environmental effects. Patterson's (1982) coercion model specifies very high orders of shared environment and specifies the quality of interactions and products that follow from it. If one child is antisocial, the others are also at higher risk to be so identified; similarly, if one child is delinquent, the others are likely to be. Based on their extensive review of the literature, Rutter et al. (1990) have also commented on the fact that estimates of heritability for delinquency (official records) strongly suggest high orders of shared environmental influence.

The high order of covariation for levels of social behaviors among siblings is in direct contrast to findings cited in reviews by behavioral geneticists such as Plomin (1986) and others (e.g., Daniels, Dunn, Furstenberg, & Plomin, 1985; Dunn, 1983; Dunn & Sherrod, 1988; Reiss, Plomin, & Hetherington, 1991; Rowe & Plomin, 1981; Scarr & Grajek, 1982). In his review, Plomin (1986) found that sibling correlations—based primarily on parent and sibling self-reports—were consistently less than .20 for personality variables. This low order of magnitude is consistent with the correlation of .16 reported by Ahern, Johnson, Wilson, McClearn, and Vandenberg (1982).

There is reason to believe that low estimates of shared environmental variance for children's social behaviors might be premature. Most of the early work was based on data from mothers' reports on questionnaires about their children. As Graham and Stevenson (1985) noted, however, estimates of heritability for children's social behavior varies as a function of sex of child and reporting agent. For example, the data showed reasonable convergence in estimates for general behavior disorder for girls when using reports from mothers, fathers, and teachers. For boys, the estimates of concordance tended to be much lower and very different, depending on who the reporting agent was. Similarly, Lytton, Watts, and Dunn (1989) showed heritability estimates for child antisocial behavior for 9-year-olds that ranged from 76% based on teacher data, 40% based on mother report, and 0% based on father data. Incidentally, Lytton's (1977) report showed very little heritability when using observational data for 2-year-olds. Clearly, estimates of concordance, heritability, and unshared environmental variance are important concepts, but the role these variables play in socialization theory has to await resolution of the fact that their estimates for all the variables seem to vary as a function of agent and method used to collect the basic data.

As Hoffman (1991) correctly argued, there are many factors that create similarities and others that create differences among siblings. The question is *why* any two siblings are different or similar. As viewed by behavioral geneticists, children growing up in the same families may share no more similar environmental experiences than do children taken at random (Plomin, 1986).

It is the purpose of this chapter to focus on sibling interaction patterns in middle childhood as predictors of adjustment outcomes in males during adolescence and early adulthood. Our presentation here is based on the social interactional perspective. We believe that families characterized by high densities of coercive exchanges define a homogeneous social environment shared by all its members, parents, and siblings alike. Thus, it is our expectation that in coercive families the shared environment is extremely high. For example, 6 to 10 observations in the homes of a sample of families of aggressive boys showed a median correlation of .69 for the covariation of the rate of coerciveness among all family members (Patterson, 1982). An extremely coercive sibling reacts to extremely coercive parents and siblings. In fact, in 40% of these exchanges, a coercive child reacted to both a sibling and a parent! Observation data collected in the home demonstrate that aggressive children and their siblings are part of the same process of coercive exchanges, *and* that their levels of coerciveness correlate highly. Furthermore, both the siblings and the coercive child demonstrate significantly higher levels of observed aggressive behavior in the home than do children from nonclinical families (Arnold, Levine, & Patterson, 1975). In their study of 27 families referred for treatment, the mean observed rate of coercive behavior was .76 behaviors per minute for the target children and .56 per minute for the 55 siblings. In contrast, the mean for a matched sample of boys from nonclinical families was .27 rpm. Not only were the siblings twice as aversive as boys from nonclinical families, but the clinical families with the highest rate aggressive boys also contained the highest rate siblings (r = .74). The Arnold et al. (1975) findings were recently replicated by Dadds, Sanders, Morrison, and Rebgetz, (1992), who found "remarkable" similarities in levels of siblings' deviant behavior in a clinic-referred group. Siblings of depressed and mixed-disorder brothers and sisters were more similar to the comparison group siblings. For a nonclinical sample, Patterson, Dishion, and Bank (1984) found a correlation of .43 among siblings for deviant behavior.

SIBLINGS AS AMPLIFIERS AND TRAINERS FOR HIGH-AMPLITUDE AGGRESSION

We believe that parents of aggressive children inadvertently reinforce the child for coercive behaviors such as noncompliance, temper tantrums, yelling, whining, arguing, and hitting. For a coercive preadolescent, these behaviors form about 13% of the interactions with family members, as compared to about 5% for nonreferred boys (Patterson, 1984). Similarly, Shinn, Ramsey, Walker, Steiber, and O'Neill (1987) found that, on the playground, about 10% of 5th-grade aggressive boys' interactions were negative, as compared to about 4% for comparison boys. It is curious that such a small portion of the child's repertoire becomes so salient in determining the future trajectory of the aggressive child (Ramsey, Bank, Patterson, & Walker, 1993; Ramsey, Patterson, & Walker, 1990). We believe that sibling interactions constitute a significant portion of the aggressive child's experience in learning to use antisocial behaviors. His or her coercive behaviors are followed by reinforcing contingencies that describe a form of escape conditioning or negative reinforcement (Patterson, 1982; Snyder & Patterson, 1986, 1992). That is, there is a sequence of negative interactive behaviors followed by the sibling giving up and either going along with the wishes of the coercive child or leaving the situation. There is also evidence that siblings, and later on peers, provide a substantial amount of positive reinforcement for antisocial acts (Dishion, Patterson, Poe, Griesler, & Andrews, 1992; Patterson, Reid, & Dishion, 1992).

Most theories of child development and child pathology are parent centric. Traditionally, interactions with the parents are thought to be the major determinant of pathological outcomes (Conger et al., 1992, 1993; Patterson, 1982, 1986a; Patterson & Bank, 1986, 1989). According to the coercion model, it is some combination of a difficult toddler and a marginally effective parent that sets in motion the process of the child's aversive behavior being negatively reinforced (Patterson, 1982). The irritable parent who backs off when the child behaves coercively can quickly produce an oppositional preschooler. For example, observation data showed that when either the mother or father was interacting with the sibling of the coercive child, there were no significant differences between comparison families and families of socially aggressive and abused boys (Patterson, 1982). Thus, the identified target child may occupy a very special niche in these families. When the interactions with the coercive boys were included in the analyses, however, the differences among nonclinical and clinical samples were highly significant. Whatever it is that the parents are doing with the coercive child, they are evidently not doing it with his or her siblings. These data are consistent with the theory and findings of Plomin (1986) and his colleagues. Thus, it may be that parents and siblings have similarly aversive relationships with the aggressive child in the family, but enjoy more positive interactions with one another. It is also possible that siblings—especially poorly supervised siblings—create a shared environment of their own in which their parents do not typically participate.

Indeed, parents permit significantly high levels of coercive interaction among siblings. For example, negative interactions between siblings are all right, so long as it does not involve the mother or father (Patterson, 1982). In a series of studies, Patterson, Reid, and their colleagues found the coercion rates for siblings from clinical samples to be at least 50% higher than coercion rates for siblings from nonclinical families. Siblings were involved in 59% of all child coercive episodes, and this percentage did not differentiate nonclinical from clinical samples. On the other hand, parents were involved in more than 80% of the coercive episodes with clinic-referred children (Patterson, 1984). This suggests that quite often the sibling and the parent contribute together to the shaping or "training" of the coercive child. What are their relative contributions to this process?

Note, as depicted in Figure 9.1, that the coercion model, which posits a direct path from Unskilled Parenting Practices to Child Antisocial Behavior, has embedded in it the microsocial variables, negative intrusions to the aggressive child (or "startups"), and negative reinforcement of the aggressive child's coercive behavior (or "backoffs"). These variables represent the moment-to-moment microsocial exchanges between parent and child and between siblings. As implied by the figure, it is expected that parent and sibling interactions provide literally

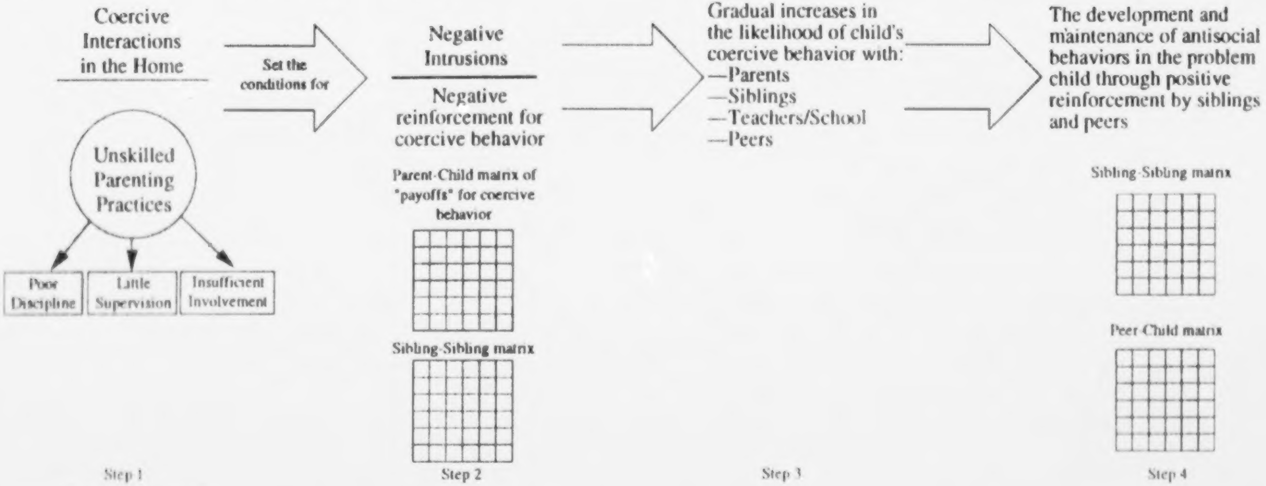
Coercive Interactions in the Home
Unskilled Parenting Practices
Poor Discipline
Little Supervision
Insufficient Involvement
Set the conditions for
Negative Intrusions
Negative reinforcement for coercive behavior
Parent-Child matrix of "payoffs" for coercive behavior
Sibling-Sibling matrix
Gradual increases in the likelihood of child's coercive behavior with:
—Parents
—Siblings
—Teachers/School
—Peers
The development and maintenance of antisocial behaviors in the problem child through positive reinforcement by siblings and peers
Sibling-Sibling matrix
Peer-Child matrix
Step 1
Step 2
Step 3
Step 4

FIGURE 9.1 Theoretical framework for development of antisocial behavior.

thousands of opportunities for a child to discover what works best in getting what he or she desires. In families with high levels of coercive interchanges, a gradual increase in the use of these "high-paying" behaviors is expected. Upon entering school, individuals with high rates of coercive behaviors are typically rejected by their nonaggressive peers. Coercive children tend to form their own "deviant" peer groups, in which antisocial behavior is positively reinforced by the group. In families with high levels of coercive behavior, siblings are also hypothesized to encourage (i.e., positively reinforce) antisocial behavior as shown in the last step in the model.

We hypothesize that the coercive style of coping with the social environment becomes a salient feature of the child's socialization process. Such an environment sets up a chain of negative consequences for the child. For example, as shown by Ramsey and associates (1990), the effects of high rates of child-coercive behavior in the home generalize to the school. The structural equation model showed a path coefficient of .73 for the antisocial behavior construct measured in the home at grade 4 to antisocial behavior in a variety of school contexts assessed at grade 5. The effect of this generalization is almost immediate, as shown by several studies of nonaggressive peer groups. Within a matter of days or weeks, it is very likely that the aggressive child will be identified and rejected by nonaggressive peers (Coie & Kupersmidt, 1983). In the Oregon Youth Study (OYS) data set, the probability of boys above the median on antisocial behavior being rejected by peers was .75 at grade 4. In addition, the likelihood of the boy who was above the mean on a multiple-indicator antisocial construct at grade 4 being rejected by peers at grade 6 was .60 (Patterson & Bank, 1989). This result was replicated in a second sample (Bank, 1990). The coercive interpersonal style is a determinant for rejection by peers. Coercive boys are also at risk for academic failure. Findings from OYS for at-risk boys in grade 4 showed very strong correlations ($r = .50$) between antisocial behavior and academic failure (Patterson, 1986a). As shown in Figure 9.1, it is expected that boys who are both coercive and rejected are at greater risk for academic failure. Patterson and Capaldi (1991) showed that peer rejection and academic failure were correlated with low self-esteem, and Patterson and Stoolmiller (1991) found boys' depressed mood to be significantly predicted by peer rejection and academic failure.

In the current study we examine the predictive power of the early sibling/coercive-child relationship on a set of criterion variables for the coercive child, including later law violations and psychological adjustment in adolescence and young adulthood. At the same time, we compare the sibling's contributions to those of his or her parents. Therefore, it is hypothesized that the specific interaction patterns of both siblings and parents with a coercive child will have statistically significant and unique impacts on the coercive child's later adjustment. In particular, negative intrusions (or "startup") and negative reinforcement (or "backoff") are expected to be key behaviors in childhood that will best predict problems in later adjustment. Negative sibling interaction (fighting or "synchronicity") is also expected to be a key predictor variable. In comparison families with no antisocial child (but with siblings of similar age as those in the referred families), no such relationship is expected to occur. The hypotheses were tested on a sample of males referred for antisocial behavior and a nonreferred comparison group.

METHOD

Study Description

This study was longitudinal in nature, with the first wave of data collected in a series of treatment studies from 1964 through 1980. Participants were either brought by their parents to the Oregon Social Learning Center (OSLC) for treatment in dealing with their antisocial behavior or were members of families recruited to serve as nonclinical comparisons. Many of the referred group participants attended only a few treatment sessions, but participated at baseline during Wave 1 and again at Wave 2. Thus, the Wave 1 data are considered *predictor* variables. Intake and demographic information, observational data, and parents' daily reports were all included in the predictor variable set. In the second data collection wave, the *criterion* variables were measured with the aid of additional funding in 1987 and 1988, and consisted of an in-depth interview, questionnaires, and arrest records.

Subjects

The OSLC database from early studies included records from 295 families with boys in the 4 to 12 age range; of these, 121 of the boys were socially aggressive and 106 were nonaggressive comparisons. The remaining 68 boys had participated in either a study of child abuse or a study of parent daily-report reliability and validity. Some of these youngsters were not yet 13 by the start of Wave 2, and for some others observational data had not been collected or were incomplete. The majority of Wave 2 participants were contacted in a pilot study and compared to those from the Wave 1 sample we were unable to contact. The participant and noncontact groups were quite similar, except that, among the treated, socially aggressive boys, the noncontact group had more therapy dropouts than the participant boys.

All together, 116 boys and men completed their participation in Wave 2: referred for treatment for aggressive behavior at Wave 1, adolescent at Wave 2, n = 32; normal comparison at Wave 1, adolescent at Wave 2, n = 23; referred for treatment of aggressive behavior at Wave 1, adult at Wave 2, n = 34; and normal comparison at Wave 1, adult at Wave 2, n = 27. Seventeen additional boys and men agreed to participate, but we lacked sufficient funding to continue the Wave 2 data collection process. The interwave interim ranged from 5 to 20 years, with a mean of approximately 10 years.

Measures

Predictor Variables

Family Interaction Coding System. This observational system was initially developed in the 1960s (Patterson, Ray, Shaw, & Cobb, 1969; Reid, 1967) and was continuously refined and evaluated during the 1970s (e.g., Jones, Reid, & Patterson, 1975; Reid, 1970, 1978; Taplin & Reid, 1973). The system has demonstrated consistent usefulness in discriminating between (a) children referred for antisocial conduct and matched control youngsters, (b) parents of socially aggressive youngsters and parents of nonaggressive youngsters, and (c) child abusive parents and nonabusive parents. It also has repeatedly demonstrated sensitivity in measuring treatment effects in antisocial and abusive families.

This coding system was designed to provide a sequential account of family interaction in the home. During observation periods, each member of the family served as the focal subject for at least two 5-minute periods. All behaviors of the focal subject and all the reactions and interactions from other family mem-

TABLE 9.1 FICS CODE CATEGORIES GROUPED BY COMPOSITES

Aversive (TAB)	Neutral (NEU)	Positive (POS)
*Command Negative	Command	Approval
Dependency	Cry	Attention
Destroy	No response	Compliance
Disapproval	Receive	Indulge
High Rate	Self-Stimulation	Laugh
*Humiliate		Normative
Ignore		Physical Positive
Negativism		Play
Noncompliance		Talk
*Physical Negative		Touch
Tease		Work
Whine		
*Yell		

*Denotes the abusive cluster.

bers to the focal subject were coded at 6-second intervals using 29 defined behavioral categories (see Table 9.1). Thirteen of these categories define aversive behavior (e.g., hit, whine, tease, and noncomply). The abusive cluster is a subset of the 13 aversive behaviors: command negative (threaten), humiliate, physical negative (hit or other negative contact), and yell. The remaining two categories cover prosocial and neutral behaviors such as play, talk, laugh, comply, and work.

The observational data were summarized to provide rate-per-minute scores for individual or group behaviors. They can be used to provide estimates of the duration of behavior and can be analyzed sequentially to determine the conditional relationships of behaviors among interactants. Total aversive behavior (TAB) is the aggregate rate-per-minute of all 13 aversive behaviors for a given subject. Conditional probabilities of interest are between two interactants. They include *startup*—the probability that neutral or positive behaviors will be followed by a negative one; *synchronicity*—the probability that a negative behavior will be followed by another negative behavior; and *backoff*—the probability that a negative behavior will be followed by neutral or positive behavior.

Parent Daily Report Data. The Parent Daily Report (PDR) is an instrument that was developed to supplement home observational data on aggression. In addition to providing data from a different agent (i.e., the mother versus trained observers), it also provides data on low base-rate aggressive acts, such as fighting, firesetting, vandalism, problems at school, and so on, that would not be observed during a home observation session. Its psychometric characteristics were recently evaluated by Chamberlain and Reid (1991), and both interparent reliability and temporal stability were demonstrated over a 1-month period.

The PDR consists of a set of 30 items that label a broad spectrum of aversive child behaviors. Each day a parent (usually the mother) is asked whether each of the 30 behaviors happened on that day. The parent does not try to recall the rate of occurrence, but only states whether the behavior occurred. The parent is called over a 2-week period (between 6 and 12 calls depending on the study). The data have been used to provide a rate per day of parent-reported child problems.

Intake: Child Problem Checklist. This checklist includes the same behavioral items as does the Parent Daily Report inventory. When parents initially come for assessment or treatment, they are asked to indicate which of the child's behaviors are particularly problematic for them. Parents of children referred for conduct disorders report over twice the number of problem behaviors than do nonreferred comparison families (Lorber, 1981).

Observer Impression Inventory. The Observer Impression Inventory was designed by Reid, Brummett, and Condon (1973) to gather systematically home observers' subjective impressions of family characteristics and behavior. The 25 items that comprise the Observer Impression Inventory include the following areas: naturalness of behavior, friendliness, hostility toward other family members and the observer, parents' attitudes toward their children, family control mechanisms, family organization, parental dominance, child abuse, and treatment prognosis.

In a study by Weinrott, Reid, Bauske, and Brummett (1981), the instrument was evaluated to assess its reliability and factorial composition. Two clustering algorithms were used, in which four clusters emerged: hostility, family disorganization, child aggression, and parent reactivity. Coefficients alpha (Cronbach, 1951) and beta (Revelle, 1979) suggested adequate internal consistency for all four clusters.

Wave 2 Criterion Variables

Target Subject Structured Interview. During the structured interview, subjects were asked to report on their own delinquent and aggressive behavior over the preceding year. The self-report instrument used was developed by Ageton and Elliott (1978) for the National Youth Survey, which included a national probability sample of adolescents. Our own research shows that randomly sampling 20 subjects to complete the self-report instrument twice yielded test–retest correlations of .873 for the total score.

The following questionnaires were completed at the interview.

Official Court Records. All existing records were obtained from both juvenile and adult court actions for each participant. Thus, for those subjects under 18 years of age, only juvenile data exist; for the young adult group, juvenile and adult data were collected. Records for Oregon, Washington, California, and Idaho were gathered as necessary.

Brief Symptom Inventory. The Brief Symptom Inventory (BSI) is the short form of the Hopkins Symptom Checklist (SCL-90-R; Derogatis & Cleary, 1977). It is a self-report instrument comprised of 53 items designed to assess symptoms of psychopathology. Subscales include somaticizing, obsession, internalizing, depression, anxiety, hostility, phobic, paranoia, psychoticism, and a global severity index (GSI) of psychopathology.

Hostility Toward Women Scale. This 30-item attitude measure assesses the target subject's hostility specific to females. This measure has been shown to have reasonable reliability and validity and to relate to rape arousal and measures of behavioral aggression (Check & Malamoth, 1983).

The Conflict Tactics Scale. The Conflict Tactics Scale (CTS; Straus, 1979) provides measures of three different conflict resolution tactics that were derived using both theoretical and factor-analytic methods: (a) *Discussion (DIS)*—the use of rational discussion and argument; (b) *Low amplitude coercive (LAC)* acts through verbal aggression—The use of verbal or symbolic means to hurt another (e.g., insults and threats of violence); and (c) *High amplitude coercive (HAC)* acts through physical aggression—The actual use of physical force. Some investigators have reported and used a fourth factor that includes items regarding the use of knives and guns and other extremely violent acts used to "resolve" disagreements. Virtually none of these items were endorsed by participants in the current study.

The internal consistency of the CTS is moderate to high; the reasoning factor shows the lowest reliability levels (.50–.76), but the alpha coefficients for the other two factors are in the .70s and .80s.

Design

The study was conceptualized as a 2 × 2 design with age at Wave 2 (13 to 18 and 18 to 30) and clinical status at intake (referred for treatment versus nonreferred comparison) as the independent variables; the Wave 2 indicators for the four adjustment outcomes are the dependent variables. Due to the longitudinal nature of this study, it is of particular interest to examine the Wave 1 home observation data as predictor variables and the Wave 2 arrest histories and questionnaires as criterion variables.

Analysis Strategy

Correlational analyses between Wave 1 predictor and Wave 2 criterion variables were conducted. Use of the full sample can be misleading when referred/treatment versus comparison groups differ markedly in their correlational patterns. Thus, for most analyses, the referred and comparison group results were reported separately. An exception to this rule is reporting adult arrests because half of the sample was under 18, and the nonreferred comparison participants were statistically no less likely to be arrested as adults than the referred participants. Therefore, the subset of participants 18 and over was used for those analyses.

A related issue with the current data set is sample size. The referred group (RG) includes 66 subjects, whereas the nonreferred comparison group (NC) includes 50 participants. The Wave 2 data were virtually complete for the BSI and the Check Hostility scales, but participants were asked to complete the Conflict Tactics Scale (CTS) only where appropriate. Some participants said that they did not have an active relationship with either of their parents, whereas others had only known one parent. In addition, only those 18 years of age and older were asked to complete the CTS for partner and friend; about 25% of these participants had no partner or close friend within the 12 months prior to completing the measure. They were not asked to complete those parts of the CTS. For parents, only Wave 1 mother data were used because many fathers had not been available to participate.

Wave 1 data were incomplete in that not all participants had observational data, and in some cases the archived data did not include all variables necessary for the analyses. As a result of these difficulties, the effective sample size for Wave 1 to Wave 2 prediction analyses was reduced to $n = 48$ for the RG and $n = 38$ for the NC groups.

Given these diminished sample sizes and the two age groups—adolescent versus adult—we decided not to use multivariate statistical analyses. Therefore, the predictive contributions of sibling versus parent Wave 1 variables must be evaluated in this data set with comparisons of zero-order correlations. These analyses are reported separately for the various adjustment outcomes.

RESULTS

Antisocial and Delinquent Behavior

Table 9.2 contains the predictive validities from Wave 1 variables to juvenile and adult arrest records. Of the 116 participants, 42 were arrested at least one time as juveniles; of the 61 participants who were age 18 or older at Wave 2, 18 had been arrested at least once as adults. There was no difference in juvenile delinquency prevalence between the under 18 (36%: 20 arrested, 35 not arrested) and over 18 (36%: 22 arrested, 39 not arrested) groups, but statistically, significantly more of the referred boys (29 of 66) as compared to the nonreferred comparison boys (13 of 50) developed juvenile records, $X^2_{(1)} = 3.96$, $p < .05$. Among the 61 boys who had reached maturity by Wave 2, however, there was no significant difference in adult arrest prevalence, with 11 of the originally referred and 7 of the comparison boys having accrued one or more recorded arrests. Of the 11 referred boys arrested as adults, 6 had also been arrested as juveniles, whereas 5 had not been arrested then; in the NC group, three of the seven with adult arrest records also had juvenile records. It should be emphasized that referred boys were accepted into the Wave 1 studies only if observed

TABLE 9.2 PREDICTION OF JUVENILE AND ADULT ARRESTS[a]

	Juvenile Arrests				Adult Arrests 18+ only)	
	Referred Interval	Nonreferred Comparison		Full Sample Interval		
		Interval	Nominal		Interval	Ordinal
Intake Problems	[10][b]	(39)[d]	52[d]	31	43[d]	55[d]
Child Total Aversive Behavior		[13]	(24)		45	(23)
Child Abusive Cluster	19			23	42	(27)
Mother Total Aversive Behavior	26	(21)	37	32	(20)	(25)
Mother Abusive Cluster	(15)[c]	(15)	(16)	(18)	49	35
Target Boy Startup with Mother	29	33	46	35	35	36
Target Boy Startup with Siblings	[11]			(15)	43	38
Target Boy Startup with Female Siblings	(23)			25	53	(20)
Target Boy Neg Synch with Mother	(16)		35	(21)	48	33
Target Boy Neg Synch with Siblings	(23)			[14]	83	58
Target Boy Neg Synch with Female Siblings	[10]		32	(15)	85	46
Mother Backoff	34	[11]		24	(-20)	(-29)
Observer Impression: Family Chaos	39	[12][d]	[18][d]	35	63[d]	61[d]
Observer Impression: Target Boy Agg	33	[13][d]	41[d]	35	56[d]	43[d]

[a] All correlations are significant at *alpha* = .05 unless otherwise noted.

[b] Bracketed numbers indicate nonsignificant correlations ($p > .20$) that may be of interest to the reader.

[c] Numbers in parentheses indicate marginally significant correlations ($.05 < p < .20$).

[d] $n = 22$. Observer impressions inventory and intake problems checklist were not yet in use in the late 1960s and early 1970s when many of the older participants were observed at Wave 1.

rates of total aversive behavior (TAB) at home equaled or exceeded those previously found for highly antisocial boys (about one antisocial event every 3 minutes). The NC boys were admitted to those studies without reference to their TAB rates, but they averaged one such event every 6 or 7 minutes, whereas the RG boys averaged nearly one event every 2 minutes.

Juvenile Arrests

Note in Table 9.2 that predictions of both juvenile and adult arrest records are included. For juvenile arrests, RG and NC validities are presented first, and they are followed by the full sample coefficients. Also note that with juvenile arrests, the NC results are listed in two columns: Pearson product-moment correlations with number of arrests (assuming an interval scale) as the criterion variable, and point biserial correlations with arrested or not arrested (assuming a nominal scale) as the criterion. This comparison is useful because the majority of NC boys with a juvenile arrest record were arrested only once; the five NC boys with more than one arrest still had very few. On the other hand, 75% of the RG boys with juvenile records were arrested more than once, and about half of those multiple offenders were arrested six times or more.

With the juvenile arrest data, the predictor variables that worked best were (a) observer impressions of the frequency of coercive acts by the targeted boy in each family during home observations; (b) rate of mother aversive behavior ($\text{Mom}_{(\text{TAB})}$) observed in the home at baseline; and (c) conditional probabilities calculated from baseline home observations, including the target boys' "startups" with his mother and siblings and synchronous negative exchanges with siblings. Thus, observed negative interactions at home during middle childhood were significant predictors of later delinquent acts during adolescence. Furthermore, these negative interactions occurred with both mothers and siblings.

Adult Arrests

All but three of the adult offenders had multiple arrests. Several of these multiple offenders, however, had large numbers of adult arrests, and these outliers tended to inflate correlations when actual numbers of arrests were used as the criterion variable. Therefore, an ordinal scale was developed with zero arrests, one or two arrests, and three or more arrests as a 3-point scale. Results with both the interval level and ordinal scoring are presented in the table because the inflated correlations with interval data are apparently based on the fact that those individuals with large numbers of adult crimes tended to be highly coercive in their home settings when observations were conducted many years prior to their adult arrests.

We find the adult arrest data to be quite compelling. Every coefficient is either statistically significant or closely approaches statistical significance. As noted earlier, correlations based on the raw arrest scores (interval level) are artifactually elevated due to the presence of three individuals with large numbers of adult arrests (34, 12, and 12) who also had very high negative interaction scores with their sisters. Although the three-category ordinal scoring of adult arrests provides more reasonable estimates of predictive validity, it is important to note that the almost uniformly higher correlations with actual numbers of arrests are due to the fact that individuals with the worst adult criminal records were typically observed in middle childhood to be highly negative in their interactions with their mothers and siblings. Synchronous negative interactions with siblings account for the largest amount of criterion variance, but negative interactions with mothers also account for significant criterion variance. Further breakdown of the adult subsample into RG and NC participants resulted in similar magnitude coefficients for the synchronous negative interaction variables. For the startup and rate (total aversive behavior and abusive cluster) variables, however, RG coefficients remained significant, but NC coefficients were consistently nonsignificant.

There was one interaction with mothers, however, that resulted in somewhat puzzling results. Note that mother "backoff" is the conditional probability of positive or neutral behavior from a mother given aversive behavior by a family member. Mother backoff predicts juvenile arrests in the expected direction for the RG participants; that is, parental reinforcement of a child's aversive acts is predictive of delinquency. For those participants who were over 18 years of age at Wave 2, however, mother backoff in middle childhood appears to function as a protective factor, with negative prediction of adult arrests that approaches statistical significance. Furthermore, the coefficients are of a similar magnitude for the adult RG and NC participants.

Self-reported Delinquency

Predictive validities for self-reported aggression and law violations as reported on the Elliott scale (Ageton & Elliott, 1978) were typically of low magnitude. The single variable that predicted the Elliott score significantly for both groups was mother startup, $r = .34$, $p < .05$ for NC; $r = .31$, $p < .10$ for RG. The number of problems reported by parents at baseline worked well with the NC group, $r = .47$, and sister startup worked best for RG, $r = .40$, both $p < .05$. Other correlations did not differ significantly from zero.

Self-reports of Psychopathology as Adolescents and Young Adults

Predictions of the Brief Symptom Inventory (BSI) scales at Wave 2 are shown in Tables 9.3a and 9.3b. These results are striking in several ways. First, predictive validities from middle childhood to adolescence and young adulthood for the RG subjects (Table 9.3a) are powerful across all areas of psychopathology assessed, but this is not the case for the NC participants (Table 9.3b). Second, the best predictors of RG psychopathology are the negative sibling interaction variables, including startup and synchronous negative behaviors. The same variables, however, have absolutely no predictive power for the NC group. Third, mother backoff is the only Wave 1 variable that predicts self-reported psychopathology in the NC group, but this variable exhibits no predictive power with RG participants. Note that the global severity score (GSI) is well predicted for the RG by child total-aversive behavior, startup, and synchronous negative behaviors with siblings, whereas the GSI is significantly predicted for the NC only by mother backoff ($r = .31$). The boys' Wave 1 startup with siblings is the best predictor of global severity, $r = .57$, for the RG participants.

Self-reports of Hostility Toward Women During Adolescence and Young Adulthood

The Check Hostility Scale (CHS) was completed by all participants at Wave 2. In Table 9.4, the RG boys' responses to the Check measure are well predicted by Wave 1 observational data

Table 9.3a Wave 1 Prediction of Wave 2 BSI Scores for the Referred Group ($n = 48$)[a]

	SOM	OBC	INT	DEP	ANX	HOS	PHO	PAR	PSY	GSI
Intake Problems										
Child Total Aversive Behavior		29	26	31		37		41		32
Child Abusive Cluster										
Mother Total Aversive Behavior										
Mother Abusive Cluster										
Target Boy Startup with Mother										
Target Boy Startup with Siblings	47	42	51	51	43	42	51	49	50	57
Target Boy Startup with Female Siblings	34		41	27			33	45	31	
Target Boy Neg Synch with Mother										
Target Boy Neg Synch with Siblings	33	31	50		41	29	32			36
Target Boy Neg Synch with Female Siblings					33					
Mother Backoff										
Observer Impression: Family Chaos										
Observer Impression: Target Boy Agg										

[a] All correlations are significant at *alpha* = 0.5 unless otherwise noted.

Table 9.3b Wave 1 Prediction of Wave 2 BSI Scores for the Nonreferred Comparison (n = 38)[a]

	SOM	OBC	INT	DEP	ANX	HOS	PHO	PAR	PSY	GSI
Intake Problems										
Child Total Aversive Behavior										
Child Abusive Cluster										
Mother Total Aversive Behavior										
Mother Abusive Cluster										
Target Boy Startup with Mother										
Target Boy Startup with Siblings										
Target Boy Startup with Female Siblings										
Target Boy Neg Synch with Mother										
Target Boy Neg Synch with Siblings										
Target Boy Neg Synch with Female Siblings										
Mother Backoff			48	36		31	32	36		31
Observer Impression: Family Chaos										
Observer Impression: Target Boy Agg										

[a] All correlations are significant at *alpha* = 0.5 unless otherwise noted.

TABLE 9.4 WAVE 1 PREDICTION OF THE WAVE 2 CHECK HOSTILITY SCALE[a]

	Referred Group (n = 48)	Nonreferred Comparison (n = 38)	Full Sample (N = 86)
Intake Problems		(23)	
Child Total Aversive Behavior	(22)[b]	(19)	26
Child Abusive Cluster	(25)		(21)
Mother Total Aversive Behavior			
Mother Abusive Cluster			
Target Boy Startup with Mother	(26)		27
Target Boy Startup with Siblings	45		34
Target Boy Startup with Female Siblings	46		36
Target Boy Neg Synch with Mother	(16)		(19)
Target Boy Neg Synch with Siblings	49		32
Target Boy Neg Synch with Female Siblings	43		28
Mother Backoff			
Observer Impressions: Family Chaos			
Observer Impressions: Target Boy Agg			

[a] All correlations are significant at *alpha* = 0.5 unless otherwise noted.
[b] Numbers in parentheses indicate marginally significant correlations (0.5 < p < .20).

from middle childhood. In particular, note the strong predictive validities for negative interactions with siblings at Wave 1. It must be emphasized that there are essentially no statistically significant validities for the NC group.

Self-reported Conflict Tactics During Adolescence and Young Adulthood

The scoring of Straus's (1979) Conflict Tactics Scale (CTS) was completed, as described earlier, with three factors: verbal reasoning and discussion, low-amplitude coercive behaviors, and high-amplitude coercive behaviors. Participants reported conflict tactics for relationships relevant to them over the 12-month period just prior to Wave 2, including problem-solving interactions with their mothers and fathers, and for those boys 18 years of age and older, their interactions with a significant partner (girlfriend, wife, or lover) and friend as well. Participants were instructed to respond in two ways: first, as they perceived the other individual's strategies in dealing with them during a conflict; and, second, as they perceived their own strategies in dealing with the other individual during a conflict. Due to the large number of predictive validities generated, only those areas with consistent patterns of coefficients are summarized in Table 9.5a (conflict tactics in relationships with fathers and mothers) and Table 9.5b (conflict tactics in relationships with partners and friends).

Tactics with Mothers and Fathers. Patterns of interaction at home during middle childhood did not affect current conflict tactics with fathers on the discussion factor as reported by RG boys; for NC boys, however, there was a clear pattern of negative coefficients, with lower discussion scores with fathers associated with Wave 1 startup and synchronous negative interaction variables with mothers and siblings (see Table 9.5a). Precisely the same results emerged for reported discussion with mothers, and in both cases the effect was bidirectional (i.e., reported as mutually used tactics).

For both the RG and NC boys, the low-amplitude coercion factor was not consistently predicted for conflict tactics with fathers or mothers, but for the RG the high-amplitude factor was significantly predicted for conflict tactics with both parents by

Table 9.5a Wave 2 Conflict Tactics Factor Predicted by Wave 1 Observations[a]

Father	Mother
Discussion:	*Discussion:*
NCs →	*NCs* →
(1) Mom startup, synchronous negative, and TAB all predict less discussion with father (both directions: *rs* = –.42 to –.66).	(1) Mom startup, synchronous negative, and TAB all predict less discussion with mother (both directions: *rs* = –.35 to –.62).
(2) Synchronous negative with mom and siblings predictive of less discussion initiated by subject to his father (*rs* = –.40 to –.49).	(2) Synchronous negative with mom and siblings predictive of less discussion initiated by subject to his mother (*rs* = –.36 to –.39).
Low-Amplitude Coercive:	*Low-Amplitude Coercive:*
NCs →	*NCs* →
High-Amplitude Coercive:	*High-Amplitude Coercive:*
RGs →	*RGs* →
(1) Startup with siblings is predictive of high-amplitude acts with fathers (both directions: *rs* = .43 to .51).	(1) Startup with siblings is predictive of high-amplitude acts with mothers (both directions: *rs* = .46 to .62).
(2) Synchronous negative is predictive of high-amplitude acts to father (*rs* = .34 to .48).	(2) Synchronous negative is predictive of high-amplitude acts to mothers (both directions: *rs* = .34 to .39).

[a] All correlations are significant at *alpha* = 0.5 unless otherwise noted.

TABLE 9.5B WAVE 2 CONFLICT TACTICS FACTORS PREDICTED BY WAVE 1 OBSERVATIONS[a]

Partner	Friend
Discussion:	*Discussion:*
NCs →	*NCs* → Synchronous negative with siblings predicts poor communication with friend (both directions: *rs* = –.42 to –.57).
Low-Amplitude Coercive:	*Low-Amplitude Coercive:*
RGs → Subject's Wave 1 abusive cluster predictive of low amplitude acts with partner (both directions: *rs* = .54 to .62).	*RGs* → Subject's Wave 1 TAB and abusive cluster predictive of low amplitude acts with friend (both directions: *rs* = .42 to .55).
NCs → Subject startup with mom and siblings predictive of partner's low amplitude acts (*rs* = .41 to .59).	*NCs* →
High-Amplitude Coercive:	*High-Amplitude Coercive:*
RGs → Synchronous negative with siblings predictive of high amplitude acts to partner (*r* = .57).	*RGs* → Synchronous negative with mom predictive of high amplitude acts with friend (both directions: *rs* = .39 to .45).
NCs →	*NCs* →
(1) Startup with mom predictive of high amplitude acts with partner (both directions: *rs* = .55 to .57).	(1) Startup with mom and mom abusive cluster predictive of high amplitude acts with friend (both directions: *rs* = .44 to 70).
(2) Juvenile arrest predictive of high amplitude acts to partner (*r* = .48).	(2) Juvenile arrest predictive of high amplitude acts with friend (both directions: *rs* = .36 to .50).

[a] All correlations are significant at *alpha* = 0.5 unless otherwise noted.

observed negative interactions with siblings (primarily) and mothers during middle childhood (see Table 9.5a). No such results were obtained for the NC group.

Tactics with Partners and Friends. Discussion with partners was not significantly and consistently predicted by any Wave 1 variable, but for NC participants fewer reports of discussion as a conflict tactic with friends was consistently predicted by the boys' synchronous negative interaction patterns with siblings during middle childhood (see Table 9.5b). Low-amplitude coercive behaviors with both partners and friends were predicted for RG participants by their abusive behaviors (hit, yell, humiliate, and threaten; see Table 9.1) during Wave 1 home observations; total aversive behavior (see Table 9.1) also predicted low-amplitude coercion with friends. For NC participants, the number of low-amplitude acts directed at them by their partners was predicted by their own startup behaviors with their mothers and siblings during middle childhood. High-amplitude coercive behaviors with partners and friends were predicted for the RG boys by Wave 1 synchronous negative interactions with their siblings and mothers. For the NC boys, however, high-amplitude behaviors were best predicted by Wave 1 startup with their mothers and by their juvenile arrest records. The magnitudes of these predictive validities are summarized in Table 9.5b.

Mean Differences Between the Groups. It is also worth noting there were largely consistent *mean* differences between the RG and NC participants in each category of the Conflict Tactics Scale (CTS). For example, RG means were higher than those for NC on all eight comparisons (mother, father, partner, and friend as directed to and from the participant) on the high-amplitude factor; precisely the same pattern was obtained with the low-amplitude factor comparisons, with the single exception of "mom to me" ($M = 11.5_{NC}$ versus 11.2_{RG}). Similarly, the discussion factor comparisons revealed lower means (i.e., less discussion) for RG as compared to NC on six of the eight scores, with no difference for "me to friend" and a slight difference for "friend to me" ($M = 11.7_{NC}$ versus 11.8_{RG}). All eight of the mean differences on the high-amplitude factor, and six of the eight on the low-amplitude factor, reached or approached statistical significance; only three of the eight discussion factor comparisons marginally approached statistical significance ($ps \sim .25$).

DISCUSSION

The most dramatic aspect of the current study is that data gathered during home observations, an average of 10 years prior to the Wave 2 collection of criterion data, are significantly and substantially predictive of a variety of adjustment outcomes for the Referred Group (RG) and Nonreferred Comparison (NC) participants. More specifically, it was hypothesized that negative interactions during middle childhood with siblings and parents would be the most powerful predictors of adjustment in adolescence and early adulthood, and this was indeed the case. It must be emphasized, however, that sample sizes were small for all analyses, and these results should be looked on as only suggestive in nature.

Antisocial and Delinquent Behavior

Juvenile and adult law violations were significantly predicted by a variety of Wave 1 variables, as shown in Table 9.2. Juvenile crime was best predicted by mothers' high rate coercive behavior and especially by boys' "startup" with their mothers. This finding held for both the RG and NC boys. Contributions of sibling negative interaction variables to the prediction of juvenile arrests were not consistent across groups. On the other hand, prediction of *adult* arrests was consistently and significantly made by the targeted boys' synchronous negative behaviors with siblings during middle childhood, and these findings were obtained for both groups.

Psychopathology

Results were striking in this area. For the RG, startup and synchronicity with siblings significantly predicted all categories of the BSI (see Table 9.3). Thus, it may be that for aggressive youngsters in difficult home situations, opportunities to practice coercive behaviors with one's siblings during childhood not only increases the risk of coercive behavior in other contexts, but by adolescence and early adulthood also leaves the aggressive child with a strong sense of inadequacy, incompetence, and hostility.

Of note and consistent with our expectation, the NCs show absolutely no evidence of sibling interaction patterns leading to later psychopathology. Mother backoff is the only significant predictor of self-reported psychological problems on the BSI. This outcome was not hypothesized and is intriguing for several reasons. First, mother backoff is a critical variable in our theoretical framework as it defines the introduction of negative reinforcement to both the targeted boys and their siblings (see Figure 9.1). Second, this variable functioned as hypothesized in the prediction of juvenile arrests for RG but not NC boys. Mother backoff did not predict adult arrests as had been expected. With the consistent prediction of BSI subscales among NCs, it appears that in nonreferred families a lack of structure and contingent discipline techniques may produce children with mental health difficulties by adolescence and early adulthood. It should be emphasized that poorly skilled parents are likely to fail with a more difficult child, regardless of whether the parent behaves coercively or tries to ignore (i.e., backoff from) the child's problem behaviors. The skilled parent is more apt to provide frequent opportunities for the difficult child to earn positive parental responses through appropriate behavior, while simultaneously responding to the child's negative behaviors with consistent (nonharsh) discipline.

Hostility Toward Women

The results from the Check (Wave 2) measure were simple yet disturbing. Wave 1 startup and synchronicity with siblings (and to a lesser degree with mother) strongly predicted later hostility toward women as reported by the RG boys. There were no significant findings for the NC boys on this criterion measure.

Thus, once again, it is our thinking that, in referred families, unsupervised siblings have nearly unlimited opportunities to practice and perfect negative interaction patterns with each other. The product of these hundreds—and possibly thousands—of practice rounds may be a firmly entrenched disregard for those they can victimize. In poorly functioning families, the boys' victimization of their sisters and mothers, in particular, may have led them to develop a disdain and disrespect for girls and women as weaker and less capable.

Conflict Tactics

This final area of adjustment outcomes addressed in the current study is summarized in Tables 9.5a and 9.5b. The results suggest that, by adolescence and early adulthood, RG as compared to NC participants are much more likely to use high- and low-amplitude coercive behaviors in attempting to resolve conflicts with parents, partners, and friends alike. Thus, childhood antisocial behaviors appear to produce, or at least predict, adult coercive relationships. Self-reports of communication strategies to resolve conflicts are similar across the RG and NC participants, although they are endorsed slightly more often by the NCs.

Note, however, in the tables that the use of communication strategies in conflict resolution is well predicted for the NCs, but not for the RGs. Thus, for the NCs, Wave 1 negative interaction patterns with mothers result in significantly fewer communication strategies in relationships with both parents during adolescence and early adulthood. Similarly, NCs with Wave 1 negative interaction patterns with siblings were more likely to report poor communication strategies with friends at Wave 2. These prediction patterns appear straightforward and sensible for the NCs, which follows that more positive communication patterns with parents and siblings at Wave 1 were predictive of similarly positive techniques in conflict resolution at Wave 2. The fact that communication strategies among the RG participants is not predicted by childhood variables is of interest; it is possible that the self-reported discussion tactics used by RG participants are qualitatively quite different from those of their nonreferred comparison counterparts.

Across all relationships assessed, the use of high-amplitude coercive behaviors by the RGs was typically predicted by negative interactions with siblings and to a lesser extent with mothers at Wave 1. By contrast, for the NCs, no high-amplitude behaviors with either parent were predicted by Wave 1 behavior patterns, but with friends and partners, both Wave 1 negative interaction patterns with mothers and juvenile arrest records were predictive of these more aggressive acts. Thus, for the RGs, negative sibling interaction patterns during middle childhood appear to be highly predictive of later adjustment patterns. For the NCs, although sibling relationships do appear to be significant predictors of a variety of outcomes, negative interaction patterns with their mothers may carry greater predictive power.

These findings are consistent with our theoretical framework suggesting that less skilled parents will be unable to supervise capably and discipline an antisocial child, and that such a child in a poorly supervised home setting is likely to victimize his sibling(s) and do so at a high rate. As depicted in Figure 9.1, it is our position that the aggressive child will then use these highly practiced "skills" in other settings and in other relationships. The nonreferred comparison families in this study were, of course, not without their problems, too. Nonetheless, it is our expectation that, in general, more skilled parents were at work in these families and, consequently, there would have been significantly fewer opportunities for an aggressive child to victimize his sibling(s). As noted earlier, those NC boys who were arrested as juveniles were usually arrested only once; these boys were less frequent and perhaps less serious offenders than the RG boys with large numbers of arrests.

Unanswered Questions

Several questions remain to be addressed. First is the issue of whether the results of this study will be replicated. The reader is cautioned to view the results reported here as tentative and only suggestive due to the small sample sizes for most analyses and the need for replication. For example, although the results of this study are consistent with the critical hypotheses, certain questions have arisen, such as the role of mothers' negative reinforcement of children's coercive behaviors; current results suggest developmental trajectories with different kinds of difficulties (i.e., delinquency versus other psychopathology) for coercive and noncoercive children who experience similar maternal behavior.

In addition, there is already substantial evidence to suggest that siblings of coercive children are also at high risk for poor adjustment outcomes (e.g., Arnold et al., 1975; Dadds et al., 1992; West & Farrington, 1973). Longitudinal study of siblings' development will be necessary to understand how such effects may manifest. Furthermore, what is the developmental trajectory for sisters of coercive boys? We might expect increased psychopathology for these girls in adolescence and adulthood, but little work has been accomplished in this area.

A newly funded study designed to answer these and other questions has just begun at our Center. Thus, we hope to make significant progress in understanding sibling development over the next few years.

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10

A RISK-AMELIORATION MODEL OF SIBLING RELATIONSHIPS: CONCEPTUAL UNDERPINNINGS AND PRELIMINARY FINDINGS

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In this chapter we build on studies from an ongoing research program designed to examine the contributions of family processes and child temperaments to variations in sibling relationship quality (Brody & Stoneman, 1987, 1990; Stoneman & Brody, 1993a). In the model that has guided our investigation to date, we proposed that the affective quality of each parent's relationship with each child contributes to the development of closeness and positivity among siblings. Positive parent–child relationships are hypothesized to contribute to the development of prosocial orientations among siblings, in accordance with attachment (Sroufe & Fleeson, 1986) and social learning (Parke, MacDonald, Beitel, & Bhavnagri, 1988) theories. Attachment theorists propose that children develop internal representations of relationships from interactions with their primary caregivers, which they subsequently use in maintaining other relationships. Social learning theorists have shown that behavior patterns enacted during parent–child interactions are generalized to sibling (Patterson, 1984) and peer interactions (Parke et al., 1988). We and others (Brody, Stoneman, & Burke, 1987b; Brody, Stoneman, & MacKinnon, 1986; Brody, Stoneman, & McCoy, 1992, 1994; Brody, Stoneman, McCoy, & Forehand, 1992; Dunn & Kendrick, 1982; Hetherington, 1988; Howe, 1986; Stewart, Mobley, Van Tuyl, & Salvador, 1977; Stocker, Dunn, & Plomin, 1989) have found higher levels of parent–child relationship positivity to be linked with higher levels of positive affectivity and prosocial behavior in sibling relationships. Similarly, negativity in the parent–child relationship is associated with aggressive, self-protective behavior in sibling relationships.

Parents' differential treatment of siblings is also hypothesized in our model to contribute to variations in sibling relationship quality. Discrepancies in parents' treatment of their children have been described in social learning (Bandura, 1977), psychoanalytic (Freud, 1916/1949), self-esteem maintenance (Tesser, 1980), and equity (Adams, 1965; Walster, Bercheid, & Walster, 1973) theories, and are conjectured to create negativity in the sibling relationship by inducing feelings of rivalry and anger. Data from several research programs support this hypothesis, revealing sibling relationships to be more negative and less positive when parents' behaviors are directed unequally toward their children (Brody, Stoneman, & Burke, 1987a; Brody, Stoneman, & McCoy, 1992; Brody, Stoneman, McCoy, & Forehand, 1992; Bryant & Crockenberg, 1980; Hetherington, 1988; Stocker et al., 1989).

Our contextual orientation also emphasizes interdependency among the marital relationship, the general emotional climate of the family, and sibling relationships. The link between marital quality and sibling relations is suggested by literature addressing children's responses to marital conflict, which has been conceptualized as an aversive event that creates distress in the child. Cummings's work (Cummings, Zahn-Waxler, & Radke-Yarrow, 1981, 1984) has demonstrated that expressions of unresolved anger are distressing to children who witness them. Whether assessed using parent diaries of children's reactions to parental conflict, or laboratory analysis involving simulated fights between strangers (Cummings, 1987), children as young as 12 months old have been found to respond to episodes of anger that are not directed toward them with signs of distress, ranging from crying to an increase in aggression. Although many individual differences remain unexplained, both this series of studies and numerous field investigations (Emery, 1982) indicate that anger directly causes negative emotional reactions in children, who often direct these reactions toward others. We have found that martial unhappiness, conflict, and less cohesive family emotional environments are associated with less positivity and more negativity in sibling relationships (cf. Brody, Stoneman, McCoy, & Forehand, 1992).

In addition to focusing on the interdependencies among social systems within the family, we also examined the contributions of parents' and childrens' individual characteristics to variation in sibling relationship quality. Research on the association between parent–child relations and parents' individual characteristics has focused extensively on parental negative affectivity (depression and hostility). Depressed and hostile parents have been found to be less involved with and affectionate toward their children, to feel more guilt and resentment, and to experience more general difficulty in managing and communicating with their children (Rutter, 1990). We have found higher levels of parental negative affectivity to be related to higher levels of negativity and lower levels of positivity in sibling relationships (Brody et al., 1994). The arousal generated by interacting with a depressed or hostile parent may disrupt or otherwise negatively affect children's capacities to regulate their emotions and behavior (Fabes & Eisenberg, 1992).

We further hypothesized that variations in sibling relationship quality would be influenced by children's temperaments. In our research we have not explored the origins of differences in temperament between siblings, but have focused on the contribution that child temperament makes to variations in sibling relationship quality that exist at the time of assessment. Children with highly active and emotionally intense temperaments, which some researchers have termed *difficult*, are more likely to experience conflict in their sibling relationships (Brody et al., 1987a; Stocker et al., 1989; Stoneman & Brody, 1993b).

Having described our past research, we now turn to our future direction. We are particularly interested in a more refined specification of the processes that send sibling relationships on positive or negative trajectories. We have been intrigued with the power of each child's personality or temperament in shaping the form and quality of sibling relationships. Yet not all children with difficult temperaments have conflicted or distant sibling relationships. Insufficient attention has been given to determining the ways in which risk factors for compromised sibling relationships, such as child temperament, are ameliorated or exacerbated by family processes. In this chapter, therefore, we provide additional information on temperament, describe a risk-amelioration model of sibling relationships, and present preliminary data on hypotheses included in the proposed model.

TEMPERAMENT AS A RISK FACTOR FOR CONFLICTED SIBLING RELATIONSHIPS

Temperament refers to individuals' behavioral styles as they relate to other persons and to the inanimate environment, and is generally considered to be formed early in life; to persist, with some modification, across the lifespan; and to be at least partially rooted in the child's genetic constitutional makeup (cf. Bates, 1989; Buss & Plomin, 1986; Goldsmith et al., 1987).

Temperamental stability is low during infancy and toddlerhood and increases during the preschool and middle-childhood years (Buss & Plomin, 1975). Martin and his associates found 6-month test–retest correlations for teacher assessments of temperament to range from .69 to .87 (M = .78). Lifespan data provided by Thomas and Chess (1989) indicated that the "easy-difficult cluster" assessed at age 3 correlated with assessments of the same construct during adulthood (r = .37).

Support for the hypothesis that temperament has a heritable component is increasing. Braungart, Plomin, DeFries, and Fulker (1992) studied 161 1- and 2-year-olds who were adopted at birth, 189 children of the same age who were not adopted, and almost 300 twin pairs. Identical twins had substantially higher correlations for emotionality, activity, and task orientation than did fraternal twins (.58 compared to .18 for activity at 2 years). Correlations for adoptive siblings were near zero, and the average heritability estimate for all three characteristics was .44. Based on the available data, Plomin (1990) argued that 40% to 50% of the variation observed in those behaviors that are associated with temperamental qualities is genetic.

Several researchers have found associations between difficult child temperaments and compromised parent–child interactions (e.g., Buss, 1981; Campbell, 1979; Gordon, 1983; Maccoby, Snow, & Jacklin, 1984; Milliones, 1978) and conflicted marital relationships (Stoneman, Brody, & Burke, 1989). These studies, along with the aforementioned data on the association of child temperaments with sibling relationships, indicate that difficult temperaments place children at risk for negative sibling relationships.

RISK-AMELIORATION MODEL OF SIBLING RELATIONSHIPS

We propose that the sequelae for the sibling relationship resulting from the presence of a sibling with a difficult temperament are not fixed. Rather, the sibling relationship will develop different qualities depending on the childrearing context within which it is nested. In some families, the quality of the parent–child relationship will exacerbate at-risk status, whereas in others the parent–child relationship will ameliorate the propensity for conflicted sibling relationships. From our perspective, then, the quality of the sibling relationship is determined by no single factor: rather, the approach we propose can be described in terms of the fit between individual children's temperaments and the characteristics of the larger family context. In this approach we emphasize the matches or mismatches that are created by the meshing of particular child characteristics with particular parent and family relationship characteristics. Similar approaches have been proposed by Sameroff and Chandler (1975), Thomas and Chess (1989), Lerner and Spanier (1978), and Werner and Smith (1992).

If we think of difficult temperament as a factor placing children at risk for conflicted sibling relationships, under what family conditions can we expect temperamental risk to be ameliorated, resulting in less conflicted sibling relationships? We hypothesize that families in which parent–child interactions are not governed primarily by the predispositions of children with difficult temperaments will be able to smooth out the potential conflict-provoking effects of difficult temperaments. Parents whose behavior is not driven by the child's temperament, and who are able to nurture an affectively positive relationship with the child, will ameliorate the risk status of the sibling relationship. A child with a difficult temperament who experiences affectively positive relationships with his or her parents will be likely to generalize positive interaction styles to the sibling relationship, develop prosocial orientations, and approach relationships expecting them to be supportive and responsive. Kochanska's (1993) research on childrearing practices and internalization of compliance-related behaviors supports this hypothesis. For young children with active-impulsive and emotionally intense temperaments, the type of disciplinary strategies their mothers used (e.g., induction, power assertion) did not forecast subsequent internalization of behavioral prohibitions. Affectively warm mother–child relationships, however, did forecast internalization in children with difficult temperaments. For those children with a predisposition to noncompliance, a supportive parent–child relationship overrode their dispositions, resulting in internalization.

We also hypothesize that the affective quality of the parent–child relationship will have a greater impact on the quality of sibling relationships when one child has a difficult temperament than when neither child is temperamentally difficult. Significant effort on the part of the parents is required to elicit positive, prosocial responses from a child with a difficult temperament. Children with moderately or low difficult temperaments typically experience a balance of positivity and negativity in their sibling relationships, which is the modal pattern for middle childhood and early adolescent-aged sibling pairs (Brody et al., 1994). Furthermore, we hypothesize that the ameliorative qualities of positive parent–child relationships will be more pronounced for older than for younger siblings with difficult temperaments. This hypothesis is based on descriptions of middle childhood-aged siblings' interactions and relationships, in which prominent role asymmetries are evident. Older siblings are dominant and assume managerial, guidance, and caregiver responsibilities (Brody & Stoneman, 1990). Older siblings thus are more likely than younger siblings to influence the form, as well as the affective quality, of sibling relationships.

In sum, in our risk-amelioration model of sibling relationships we posit that children with difficult temperaments place their sibling relationships at risk for conflict and rivalry. Parents can ameliorate this risk by creating affectively positive parent–child relationships despite the temperamental predispositions of their children. The creation of affectively positive parent–child relationships will assume particular importance when the older sibling has a difficult temperament. Next, we describe our initial examinations of these hypotheses.

METHOD

Subjects

One hundred nine families with same-sex children (56 pairs of brothers and 53 pairs of sisters) participated in the study. Only same-sex sibling pairs were recruited in order to control for gender effects. The comparative study of all possible sibling gender combinations would require a much larger sample, because the inclusion of relatively small numbers of siblings pairs in different gender combination cells has the potential for creating spurious results. The older siblings' ages ranged from 6 to 11 years, and the younger children were 4 to 9 years of age; each sibling pair was separated in age by at least 2 but not more than 3 years. All were from Caucasian families in which both biological parents were present in the home. The mothers' average age was 36 years, with a mean of 15 years of eduction, whereas the fathers averaged 38 years of age with a mean of 16.4 years of education. Families were middle and upper-middle class, as defined by the Myers and Bean (1968) social class index. This index, which uses the occupational and educational levels of the head of the household, ranged from Class 1 (professional) to Class 5 (welfare recipients). Families were recruited through schools, churches, and communities in rural and urban areas of two southeastern states. Approximately 80% of the families contacted agreed to participate. None were involved in any form of marital or family counseling, and the children had never received treatment for behavioral or emotional problems.

Procedure

Parent–Child Relationship Quality. Observed negativity and positivity in the youths' interactions with their parents at Time 1 were used to evaluate parent–child relationship quality. To assess mothers' and fathers' behavior with their children, each parent was videotaped interacting with the sibling pair in two play activities: a small hand-held computer game (Mario's Cement Factory or Mario's Bombs Away, Nintendo Co., Ltd.) and a Viewmaster slide viewer. These tasks were selected because they are familiar to subjects in middle to late childhood (Stoneman, Brody, & MacKinnon, 1984) and are enjoyable to both girls and boys. Task order for the parent–child triads was counterbalanced across families to avoid both activity and parent order effects. The tasks were designed to simulate family contexts in which parents could and could not give their children their full attention. Parents' attention was undivided during the Viewmaster task; in the computer task, a set of anagrams that the parents were instructed to solve served as a competing demand (see Zussman, 1980).

Siblings Interactions. Siblings were observed together during each of the two home visits described earlier. The order of the sibling dyadic interactions was counterbalanced, so that in half of the families the sibling interactions took place before the parent–child triadic interactions, and in the remaining families the parent–child triadic interactions took place first. To determine whether the order of occurrence influenced sibling interactions, a 2 (order of interaction: sibling dyadic before or after parent–child interaction) × 2 (sex of siblings) ANOVA was executed on the sibling interaction measures. No order main effects or interactions were detected for any of the analyses.

On the first home visit, sibling dyads were videotaped while playing a popular board game (Trouble, Gilbert Industries) and while sharing a snack that the researchers provided; on the second, the siblings were videotaped while playing with the Viewmaster and sharing another snack. Each activity lasted about 15 minutes, and neither parent was present during the sibling interactions.

Observational Parent–Child and Sibling Interaction Measures

In the coding system used to quantify the videotaped triadic parent–child interactions and dyadic sibling interactions, a research associate used a 5-second interval recording system from which parental and child positive and negative behaviors and sibling positive and negative behaviors were coded. The person to whom each behavior was directed was identified, and the scores for each behavior were averaged across the interactional tasks to increase the reliability of the assessments (Epstein, 1979). Operational definitions for the behaviors of interest are as follows:

- *Positive Behavior*: The target hugs, affectionately touches, or praises the other; laughs, smiles, or expresses verbal enthusiasm.
- *Negative Behavior*: The target threatens, teases, insults, or quarrels with the other; engages in sarcasm, name calling, yelling, or protesting; frowns or uses negative facial expression; hits or physically struggles with the other.

In order to assess the older and younger siblings' affective relationships with their mothers and fathers, an affective relationship quality construct was established using a two-step process. First, the averaged scores for each parent's behavior toward each child, and for each child's behavior toward each parent, were summed to create a parent–child relationship index; this was done separately for positive and negative behavior. In the second step, both the relationship positivity and negativity assessments were standardized using a mean of 0 and a standard deviation of 1. The standardized negativity scores were then subtracted from the standardized positivity scores, yielding an assessment of the affective quality of the parent–child relationship. Scores of zero indicate a balance of positive and negative affect in the relationship. Negative scores indicate a relationship characterized by negative affectivity, and positive scores indicate a relationship characterized by positive affectivity. The same procedure was used to obtain an affective quality relationship construct for the dyadic sibling interactions.

The observer who coded the interactions was experienced in the use of the coding system from previous studies, having attained reliability coefficients of 88% and 92%. Reliability for the present study was assessed by the lab supervisor; interobserver agreement for the codes, which was calculated using Cohen's kappa, ranged from 68% to 92%, with an overall coefficient of 71%.

Child Temperament Assessments. The Temperament Assessment Battery (TAB; Martin, 1984) is a modified version of the Thomas and Chess (1977) Parent Temperament Questionnaire, and is designed to measure temperament dimensions in children of ages 3 through 12 years. The activity, emotional intensity, persistence, and ease of management subscales were included in this study. Pfeffer and Martin (1984) demonstrated internal consistency (M = .70), 6-month test–retest reliability (M = .68), and validity for each subscale. These subscales were then subjected to a factor analysis, and a difficult temperament factor emerged. The factor was comprised of high activity, high emotionality, low task persistence, and low ease of management.

RESULTS

Three distinct temperamental risk-status groups were formed, separately for older and younger siblings. Older and younger siblings' scores on the difficult temperament factors were converted to Z scores. The bottom 25% of males and the bottom 25% of females were combined to form a low-risk group. The top 25% of males and the top 25% of females comprised the high-risk group. The 25% of males and 25% of females surrounding the mean on the older and younger sibling distributions comprised the moderate-risk group. Data for the 12.5% of the older and younger children who fell between the moderate- and low-risk group, and between the moderate- and high-risk group, were not used in some of the analyses.

The analyses that follow are preliminary tests of the hypotheses from the risk-amelioration model. Three sets of analyses were executed. First, for each of the older sibling temperament groups, zero-order correlations were computed between the index of parent–child affective relationship quality obtained from the triadic interactions and the index of sibling affective relationship quality obtained from the dyadic sibling interactions. The same correlations were executed for the younger sibling temperament risk groups. The parent–child relationship index was combined across parents to ascertain whether the parent–child relationship, in general, possessed ameliorative properties. The second set of analyses included hierarchical multiple regressions to examine whether the interaction of the temperament risk status and the parenting index contributed unique variation to sibling relationship quality. Finally, hierarchical multiple regression analyses were used to determine whether the ameliorative properties of the parent–older child relationship would be greater than those of the parent–younger child relationship.

Within-group Correlations between Parent–Child Relationship Quality and Sibling Relationships. The correlation between parent–older child relationship quality and sibling relationship quality was .86 for the older child, difficult-temperament group ($p < .01$); .59 for the older child, moderately difficult-temperament group ($p < .01$); and .12 for the older child, nondifficult-temperament group (*ns*). Tests for differences between these correlations indicated that the correlations between the parent–older child relationship and the sibling relationship for the difficult-temperament group was significantly greater than were the correlations for the other two groups (both *ps* $< .001$). The other correlations did not differ reliably from each other.

The correlations for the groups involving difficult temperament in the younger sibling were: parent–younger child relationship quality and sibling relationship quality in the difficult-temperament group, $r = .54$ ($p < .01$); parent–younger child relationship quality and sibling relationship quality in the moderately difficult-temperament group, $r = .55$ ($p < .01$); and parent–younger child relationship quality and sibling relationship quality in the nondifficult-temperament group, $r = .59$ ($p < .01$). One difference emerged when the correlations from each group were compared. The correlation between parent–child relationship quality and sibling relationship quality was greater in the moderately difficult group than in the difficult group ($p < .03$).

The patterning of the correlations for the older sibling groups supports some of the conjectures that we discussed earlier. The quality of the parent–older child relationship appeared to ameliorate the potentially negative effects of difficult temperament in older siblings. The quality of parent–difficult older child relationships was strongly linked to levels of positive affectivity in the sibling relationship. These data suggest that some of our thinking in this area is correct. The pattern of correlations for younger siblings were different than they were for older siblings. Sibling relationship quality in each child temperament group displayed a strong association with the quality of the parent–child relationship. The association was stronger for the moderate group compared with the difficult group. To determine whether the quality of the parent–child relationship moderated the association between child temperament and sibling relationships, two hierarchical multiple regression analyses were executed. The first analysis included the older child's temperament, the parent–older child relationship, and the product of the older child's temperament × the parent–older child relationship. The dependent measure was the quality of the sibling relationship. The second analysis included the younger sibling's temperament, the parent–younger child relationship, and the product of the two variables. The analysis involving older siblings indicated that the parent–child relationship did serve as a moderator. The interaction contributed an r^2 of 10%. For older siblings, one can expect sibling relationship quality to be more influenced by positive parent–child relationships when older children with difficult temperaments are involved. Figure 10.1 illustrates these relationships.

The results were different for younger siblings. Younger sibling temperament and parent–younger sibling relationship quality each contributed unique variance to sibling relationship quality, but the product of the two did not quite attain significance. These results suggested additional analyses.

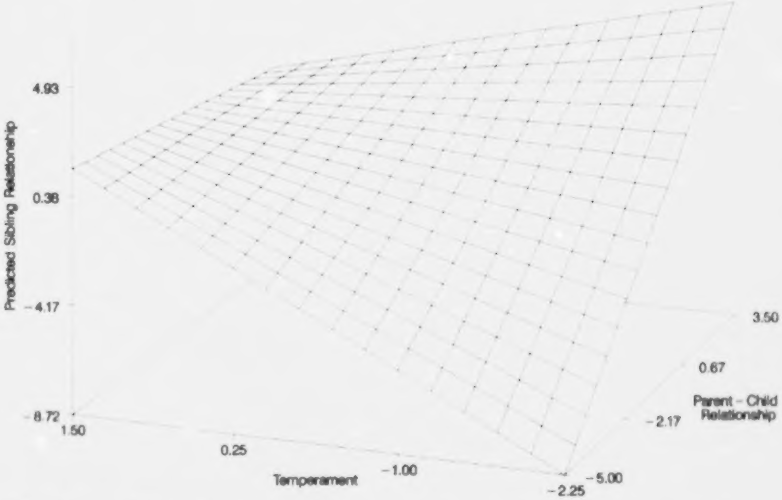

Figure 10.1 Response surface of predicted sibling relationship by temperament and parent–child relationship.

Earlier, we hypothesized that the potential moderating effects of the older sibling's relationship with his or her parents would account for more variation in sibling relationship quality than would the younger sibling's parent–child relationship. In one analysis the older sibling predictors (temperament, parent–child relationship) were added after the younger sibling predictors. In the second analysis, the younger sibling predictors were added after the older sibling predictors. For the first analysis, the older sibling's temperament, the older sibling's parent–child relationships, and the product of the two variables accounted for 48% of the variance in the sibling relationship. The only younger sibling parameter to contribute unique variation after the older sibling measures were entered was the younger sibling's parent–child relationship. It accounted for 4% of the variance in sibling relationship quality.

When the younger sibling's variables were entered first, they accounted for 34% of the variance in sibling relationship quality. The variable involving the older sibling's measures contributed 19% of the unique variance to sibling relationship quality. The older sibling's parent–child relationship accounted for 13% of the variance, and the older sibling's temperament × older

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sibling's parent–child relationship accounted for 6% of the variance (both *ps* < .005). Taken as a whole, the analyses provide preliminary support for the hypotheses proposed for the risk-amelioration model of sibling relationships. Parent–child relationships increased in importance as older sibling temperaments became more difficult, and the presence of ameliorative parent–older child relationships appears to be more important to the quality of sibling relationships than are parent–child relationships with difficult younger siblings.

FUTURE DIRECTIONS

The data presented in this chapter represent a new direction in which our research group is turning in our investigations of sibling relationships. Although individual child characteristics such as temperament have received attention in the sibling relationships literature, they have been construed as main effects. Up to now their interactions with family processes such as parent–child relationships have not been examined. Research has indicated that children with different vulnerabilities (such as difficult temperaments) respond to similar environments in different ways (Cadoret, 1985). Other studies suggest that children with hyperkinetic disorders display a heightened reactivity to family rancor and disruption (Moffitt, 1990; Taylor, Sandberg, Thorley, & Giles, 1991). It is also plausible that such children would be equally responsive to ameliorative family environments. Some support for this conjecture emerged in the analyses presented here of the associations between parent–child relationship quality and sibling relationships among older siblings with difficult temperaments. Another way of conceptualizing these findings could be to argue that a difficult temperament is one stressor, a nonsupportive parent–child relationship is a second stressor, and the pileup of these combined stressors takes its toll on the sibling relationship. We prefer to focus on the therapeutic potential of families.

From our vantage point, sibling relationships offer a window into the psychological functioning of children and family processes. Family processes that ameliorate the risk of difficult temperaments on sibling relationships probably also ameliorate risks for conduct disorders and internalizing disorders. As our knowledge base is broadened concerning the transactions between child vulnerabilities and family processes that nurture sibling relationships, the chances are good that we will also expand the knowledge base concerning those transactions that create positive developmental trajectories for vulnerable children and adolescents.

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